Report of the Director for the Session 1953-54

Teaching

Twelve Public Lectures were arranged during the Session 1953. In the Autumn Term the Director gave a course of four Public Lectures on 'The Panorama of Prehistory in 1953', at 8.15 p.m., drawing audiences ranging from 45-78, while in the Summer Term a course of six Public Lectures on 'Recent Work in Archaeology outside Europe' was delivered at 8.15 p.m., drawing audiences of 78-113. The lecturers in this series were Dr G. H. S. Bushnell, Cambridge, on South America; Mr A. Digby, Keeper of Ethnography in the British Museum, on Central America; Professor W. B. Emery on Egypt; Professor M. E. L. Mallowan on Iraq; Mr W. Watson, of the British Museum, on China; and Dr J. B. Griffin on North America. In addition to this course, Dr Schultz, from the National Museum of Copenhagen, lectured on October 20th on 'Recent Discoveries in Iron Age Denmark', and Dr Bersu, Director of the Romano-Germanic Commission of the German Archaeological Institute, lectured on recent work in Germany on November 23rd.

In addition to the usual regular courses of lectures and tutorials for diploma and technical students, the practical course on the recording of archaeological finds undertaken last Session by the Librarian and Dr Kenyon was continued in view of the demand for it. It not being the policy of the University that the Institute should become a museum, while most of the archaeological material illustrative of the Upper Palaeolithic and Bronze Ages in the British Isles consists of unique specimens which should only be housed in a museum, it has been possible, thanks to the courtesy of the Director of the British Museum, to arrange that advanced diploma students shall have access to the rich collections at present stored in the Museum's magazines. Once more a special intensive course was arranged for the students working for the Museums Association Diploma, at the request of the Association. The course was held from March 22nd to 27th, 1954, and was attended by eleven students. In addition to the Institute staff Mr C. D. P. Nicholson and Mr Grimes, Director of the London Museum, were good enough to make valuable contributions to the instruction of the students.

While the Institute as such does not take part in the Extra-Mural teaching

of the University, its facilities have been increasingly used in connection with Extra-Mural studies. Several lecturers in the Archaeology Courses in the Extra-Mural Department have been drawn from the Institute staff or senior students. Such Extra-Mural Lecturers make extensive use of the Institute collection of slides, and have become accustomed to bring their classes to the Institute on Saturday afternoons.

Finally, the Prehistoric Society again held its Annual Easter Conference in the Institute. The Conference was attended by natural scientists as well as archaeologists, and included distinguished visitors from Denmark.

Students and Research

The total number of students registered at the Institute during the Session was 61; of these, 20 were registered for Diplomas, 20 for Higher Degrees, and there were 3 full-time and 3 part-time students, and 15 technical students. For the Diploma in European Archaeology, Section A, 12 students have been working at the Institute, and for Section B, 4 students. Six of the foregoing were awarded the University's Diploma in European Archaeology A, and one in European Archaeology B. In June 1954 one student, after passing the examination, was awarded the Diploma in the Archaeology of Western Asia, and one student was awarded the Diploma in Indian Archaeology, the first of such Diplomas to be awarded since the establishment here of Indian Archaeology in the Institute. One student registered for the General Diploma in Prehistoric Archaeology.

Of the 20 students registered for the Higher Degrees, Mr Fazal Ahmed Khan was awarded the Ph.D. for his thesis 'An Archaeological Study of the Indus Valley Civilisations and their Relationship to the Culture of Iran'. Mr J. J. Butler, working on a thesis on the relations between Scandinavia and the British Isles during the Bronze Age, having been granted leave of absence by the University, has spent the Autumn and Spring Terms in Scandinavia. Miss Isobel Smith has been accepted as a candidate for the Ph.D., and is engaged on a thesis on 'Decorative Art of Neolithic Ceramics in South-Eastern England and its Relations'. The work of students in the Department of Environmental Archaeology is explained in the section dealing with that Department. Two students with scholarships from the British Council, Mr M. Prausnitz from Israel and Mr J. L. Lorenzo from Mexico, were working at the Institute, together with Mr Todd Willy, a Fulbright research student from the U.S.A., and there were 3 part-time research students, two being Internal research students under Statute 21, and one, Miss E. Munksgaard, having been sent from Denmark for part of the year. Twenty-one Intercollegiate students attended courses. There were 15 Technical students, including two

from Nigeria, one from Iraq, and one from the Sudan. Twenty Occasional students have been attending courses and using the facilities of the Institute, including one from Israel and one from the U.S.A. During the Summer Term the several Departments arranged excursions for their students, generally on Saturdays.

Collections

The most important addition to the Collections of the Institute during the year was the late F. N. Haward's collection of flint implements together with the cabinets in which they were housed, presented by the executors of the deceased.

Work on assessing and registering the specimens in the Institute's Collections has made good progress during the Session, but in view of the anticipated transfer of the Collections to new premises, the compilation of indices of sites and types is still urgently needed.

Staff

Leave of absence for the Spring Term was granted to Dr K. Kenyon, Lecturer in Palestinian Archaeology, which was utilised by her for the continuation of her celebrated excavations at Jericho.

Publications

The present report is being issued without the archaeological articles usually bound with it. These will, however, continue to be published, for the Annual Report has been found to be both a useful medium for the publication, at least in a preliminary form, of original work done at the Institute, and also an indispensable means of enriching the Library by periodicals obtained through exchange. The present volume will contain exclusively communications by students and members of the staff, including part of Dr Fazal Ahmed Khan's thesis, and papers by Mr Prausnitz on stone battle-axes from Palestine and their relations in Western Asia and Europe, and by Miss Isobel Smith on Continental relations of some pottery from the Essex coast and the date of the coastal submergence, by Dr Kenyon on some early Bronze Age weapons in the Institute's Palestinian collection, and by Professor F. E. Zeuner on the radio-carbon dates of specimens prepared in the geochronological laboratory of the Institute, and examined at the Royal Institution.

Accommodation

Detailed plans for the projected new building on the north side of Gordon

Square were worked out during the earlier part of the Session. The Accommodation Sub-Committee of the Management Committee, under the Chairmanship of Mr W. F. Grimes, held several meetings, as did the Academic Board of the Institute, and as a result an agreed scheme satisfactory to all members of the staff was eventually worked out in detail. However, considerations of University policy have involved a modification of the whole project, and new plans will have to be worked out in the Session 1954-55. In the meanwhile, the external redecoration prescribed under the terms of the University's lease will be carried out during the Autumn.

Report of the Department of Environmental Archaeology

Teaching

Whilst the attendance at courses was about the same as the previous year, the number of postgraduate students has continued to rise. There were three students working for the degree of Ph.D., two for the M.Sc., one for the M.A., and two Internal research students under Statute 21 (iii). In addition, there was one Postgraduate Diploma student, and special courses in the laboratory were arranged for three Occasional students. Four of the higher Degree students came from the Faculty of Science. Since the postgraduate and research students require much help, both in the laboratory and with their work on typological material, supervision has become a heavy burden on the staff, and some of the research work planned for the Session 1953-54 had to be put aside. In accordance with the conditions of his grant, one Ph.D. student, Mr A. Sutcliffe, has again carried out demonstrator's duties in connection with our collection of raw materials and assistance in the First Year course.

Fourteen lectures were given by members of the staff outside the Institute, of which five were delivered in other colleges of London University.

Excursions were made to the Arundel and Brighton areas, and to Swanscombe, the average attendance being 15. In addition, excavations at the caves of Torbryan, South Devon, were organised as a summer school of the Department.

Donations

The Department's teaching collection benefited considerably from donations made by the executors of the late Mr F. N. Haward, as well as by Messrs. E. J. Sawyer and J. Dekanah (South Africa).

Research

Owing to the increased number of research students, the subjects covered by research carried out in the Department range over a comparatively wide field.

Mr R. W. Andrews is investigating the possibility of varve chronology in Britain, whilst Mr A. Sutcliffe has continued to study cave fauna and sediments, mainly from sites in Devonshire. It is hoped that this work will throw light on the sequence of industries in Kent's Cavern and the Mendips. The vexed question of ferruginous horizons in archaeological sections is being studied by Mr J. Dalrymple, and Miss B. Dyer is constructing a map of soils found at Mousterian sites of Last Interglacial age, ranging from Gibraltar to the south of Russia. This map should make possible comparison with a recent soil map of Europe, and enable the investigator to compare climatic conditions in the period of the 'warm Mousterian' with those of the present day.

The Palaeolithic industries of the Indian Peninsula are being investigated by Miss J. Philips, whilst Mrs B. Allchin has successfully continued her comparison of the microlithic industries of India with similar industries in Africa and Australia.

Miss M. Howard is engaged on the study of the domestication of cattle, and is particularly concerned with the question of the breed or breeds of cattle present in the British Neolithic. Dr Cornwall has investigated soil samples from Stonehenge and found support for the Bronze Age date of the Y-holes. In addition, he has carried out work on other henge-sites and barrows.

The Cotte de St Brelade, Jersey, which Père Burdo is excavating, and with the sequence of which the Department has been concerned before (Occasional Paper No. 3, 1940), has been studied again with the help of new material. This cave is becoming increasingly important because of the discovery, not only of fauna, but of an important Acheulian industry. The investigation of the Mousterian and Upper Palaeolithic site of Gorham's Cave, Gibraltar, and that of a Mousterioid site at Cabo Negro, Tetuan, Spanish Morocco, was completed.

The site of Jericho, Jordan, now in the process of excavation under Dr K. Kenyon, has provided ample material to help in the study of the earliest stages of domestication and the environmental conditions, both from the Tell and the tombs. The problems of the presence of flesh and other perishable substances in the tombs has received special attention.

Work on radio-carbon dating was continued in conjunction with the Royal Institution. A grant which makes it possible to continue this work for another three years was given to the Head of the Department by the Department for Scientific and Industrial Research. Dr A. R. Crathorn, who has been developing the apparatus during the last three years, is unfortunately leaving, and Mrs Vera Smith, formerly of Bedford College, has been appointed as assistant to continue this work, about which a detailed report appears elsewhere in this volume.

Apart from sites studied specially in the interests of teaching and research work in the Institute, 20 requests to study soils, archaeological horizons, the nature of archaeological materials and bones, were complied with during the year.

Field Work

The Easter vacation was used for a visit to Jordan and Lebanon, most of the time being spent on investigations at Jericho. In the long vacation excavations were continued at the Palaeolithic sites in the Torbryan Valley, Devon. The work lasted six weeks, and 30 students and helpers attended. The purpose of the excavation was to provide an opportunity for students to learn the technique of excavating Palaeolithic cave sites.

F. E. Zeuner

Report of the Technical Department

Thirty students in all have been working in the Department, including 10 doing Technical courses full-time, 5 part-time, and 10 Diploma students. Although the total is rather less than in recent Sessions, the number of full-time students has been greater, and the demand for bench space large. A small room, part of the bombed verandah, which had formerly been used only for storage, was therefore made as weather-tight as possible, and a short bench and lighting installed; space was provided in this way for a further 2-3 students.

Apart from specimens in the Institute's collection, work was carried out on behalf of the following public bodies:—Lewes, Lincoln, Plymouth, Torquay, Winchester, Worthing, and Otago (New Zealand) Museums, Hendon Public

Library, and U.C.L. Egyptology Department; and for expeditions that have been excavating at Canterbury, Lullingstone, Tornewton, Wroxeter, Jericho, Lachish, Nimrud, and in Cyprus, as well as for 9 individual archaeologists.

In the second term small parties of students were taken to a number of museums in the London area, where methods of display, labelling, mounting, etc., were discussed.

The Department arranged two lectures at the Institute by Mr C. D. P. Nicholson, on the care and preservation of Roman mosaic floors and painted wall-plaster. Arrangements were also made for special visits and demonstrations at the following:—

The Courtauld Institute of Fine Art, where Mr S. Reece-Jones gave a talk on the treatment of paintings and displayed apparatus used in his laboratory;

The London Museum, where Mr W. F. Grimes spoke on museum records;

The British Museum (Natural History), where Mr L. E. Parsons and Mr A. E. Rixon demonstrated methods of casting and of treating bones;

The British Museum, Bloomsbury, where Dr H. J. Plenderleith was kind enough once again to permit a party to see his research laboratory and some of its work.

IONE GEDYE

Report of the Photographic Department

TEACHING

TEACHING demanded more time than usual, the approximate hours devoted to it being 189. Practical and written tests were given, visits to manufacturers, and competitions on a small scale, were arranged, while individual instruction was given to those who seemed backward; but the general standard attained this year was not above the average.

During the Session two exhibitions of photographic work were arranged in the entrance hall, one to demonstrate the representation of texture in pottery and weaving, and the second to display work done by students during the Session. Both gave rise to helpful comments and criticisms, and provided an item of interest to visitors.

Several parties visited the Department this Session, when other departments were also open to inspection, and short lectures on photography as applied to archaeology were given. The several groups have written appreciative letters of thanks.

The Instructor has given lectures at a Public School, a College and a photographic manufacturers, as well as for Photographic Societies.

Production

1399 lantern slides and 2534 prints and enlargements were prepared.

Equipment

It has become necessary to replace some of the lighting equipment. After protracted enquiries it appeared that the types at present being manufactured would be too light to stand up to heavy use, so the existing lights were stripped and sent to be replated and reconditioned, and have been returned better and cheaper than new ones would have been.

A tropical model 9 x 12 cms. hand and stand camera with two lenses, one 130 mm. focal length and the other 89 mm. focal length, a film pack adaptor and a roll film adaptor, have been purchased. The Department has also been able to purchase a new light-meter—a Weston Mark II—in a heavy leather protective case, this latter purchase being made through the kindness and generosity of two subscribing members.

M. B. Cookson

Library Report

The Library was fully used throughout the Session, and the number of volumes lent was the highest yet reached.

The Librarian is indebted to Sir Mortimer Wheeler for the gift of over 400 pamphlets and books, mainly on India, which are not easily obtainable; also to the executors of the late F. N. Haward and to Mr W. G. H. Drummond for collections of books and pamphlets.

During the year members of the staff, Miss J. Philips and Miss I. Smith assisted in keeping the Library open, and Miss G. Chapman was also employed.

Volumes added to the Library	213	Volumes Bound	257
By purchase	97	Volumes lent	3081
Presented	88	Highest month: May	430
Exchanged	28	Lowest month: August	85
Pamphlets added to the Library	634	Volumes borrowed from outside libraries	111
By purchase	35	Volumes lent to outside libraries	17
Presented	587	Lantern slides added to the Library	580
Exchanged	12	Lantern slides lent	2933
Periodicals added to the Library	192		

The following have presented books, periodicals, and lantern slides, to the Library:—

J. Alexander; Mrs Allchin; Mrs Amiran; A. J. Arkell; Miss D. Ashcroft; Dr Emmett L. Bennett, Jnr.; G. C. Boon; British Association for the Advancement of Science, Section H.; British Archaeological Association; Professor V. G. Childe; Miss Chitty; C.I.B.A. Review; Professor K. de B. Codrington; Companhia de Diamantes de Angola; M. B. Cookson; Dr I. W. Cornwall; Mrs Cotton; J. D. Cowen; Mrs Crowfoot; Cyprus Department of Antiquities; Prince Diskul; Walter Dupouy; H. J. H. Drummond; Per Fett; Dr Henry Field; French Embassy, Cultural Counsellor; Miss I. Gedye; Professor E. Gjerstad; Dr H. Godwin; The Goldsmith's Librarian, London University; H. S. Gordon; R. D. Greenaway; The Hague Municipal Museum; Executors of the late F. N. Haward; Professor C. F. C. Hawkes; Dr Hans Helbaek; Miss L. V. Hodgson; Mrs Hollander; Mrs E. H. Hunt; Mrs Maxwell-Hyslop; Institute of Historical Research; Jordan Department of Antiquities; H. R. Kavanagh; Dr K. M. Kenyon; Miss Koopman; A. D. Lacaille; B. B. Lal; Leicester Museum and Arts Gallery; M. F. Lofts; Mrs Mann; Dr H. L. Movius, Jnr; H. Müller; Mrs O'Neil; Palestine Exploration Fund; Col. A. Part; Mrs Webster Plass; D. Philips; E. Pyddoke; P. Rawson; J. Ritson; Science Museum Library; Executors of the late Sir Lindsay Scott; National Museum of Scotland; Serviços Geologicos de Portugal; Society of Antiquaries of London; Miss G. Stretton; Professor T. Sulimirski; Miss G. C. Talbot; Miss J. du Plat Taylor; A. C. Thomas; Miss O. Tufnell; Sir Mortimer Wheeler; Miss V. Seton-Williams; T. Willy; Winchester City Museum; Yale University Art Gallery.

JOAN DU PLAT TAYLOR
Librarian

A Crescentic Axehead from Jericho, and a Group of Weapons from Tell el Hesi

By K. Kenyon

The excavation of Tomb A 114 at Jericho in 1954 produced a fine example of a comparatively rare type of axehead (Fig. 1, 1). This is of interest in itself, for dateable finds of bronze weapons of early date are few, and also for the fact that it establishes firmly the date of an important group of bronzes from Tell el Hesi. (Fig. 1, 2; Fig. 2.)

The axehead is of the type called a scolloped axe by Petrie,[1] ϵ-shaped by Mrs Maxwell-Hyslop,[2] a halberd by Bittel[3] and scalloped by Hillen.[4] The use of the term halberd is incorrect, ϵ-shaped is clumsy and scolloped or scalloped give an incorrect idea. As the essential element is a curved cutting edge, with somewhat varied methods of attachment to the haft, the term crescentic is here preferred.

The Jericho axehead comes from a tomb with two well-marked periods of use. The lower phase belongs to the Late Chalcolithic of Palestine, and the finds are similar to those from A. 94.[5] The upper phase is Early Bronze Age III, and it is to this that the axehead belongs. Some half-a-dozen tombs of this period, containing multiple burials and very similar pots, have been excavated at Jericho. The largest is Professor Garstang's Tomb A.[6] Examples from one of the very similar tombs excavated by the present expedition were published in 1952.[7] A selection of typical forms from this level in A. 114 is here published in Fig. 3. The tombs excavated by the present expedition differ from Professor Garstang's Tomb A, in that they contain a small number of bowls of Khirbet Kerak ware. Otherwise, the finds are very closely similar, and typical of the Palestinian E.B. III. The dates assigned to this phase by Wright,[8] 2700 B.C. to 2400 B.C., are briefly discussed below.

The Jericho axehead consists of a shallow segment of a circle, with a tang

1 *T.W.* Pl. VI.
2 *Iraq*, XI.
3 *Soli*, Pl. IV.
4 *Hillen*, p. 211.
5 *P.E.Q.*, 1953, p. 11.
6 *Liverpool Annals of Anthr. and Archaeology*, XIX.
7 *P.E.Q.*, 1952, p. 76.
8 *Wright*, p. 75.

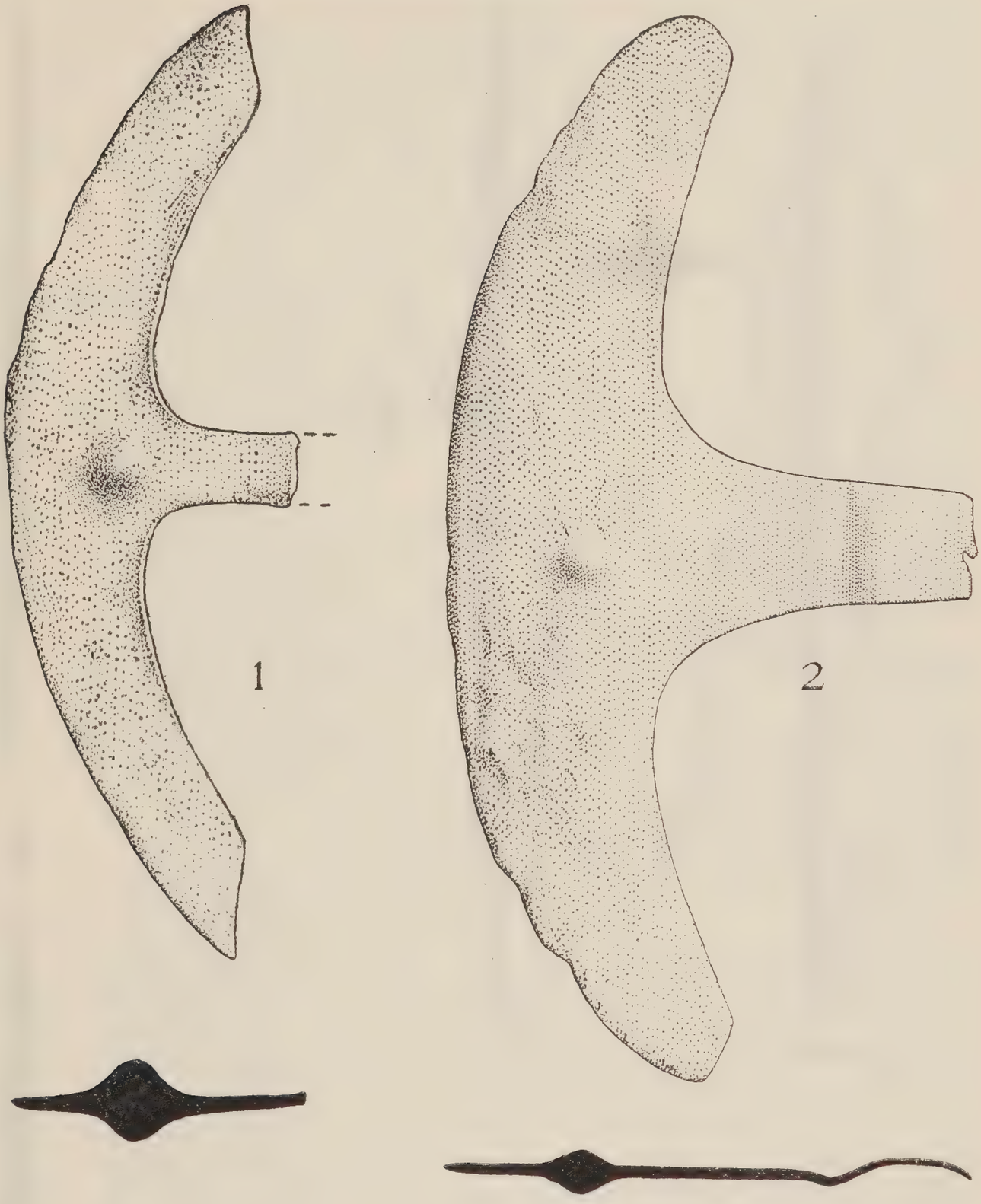

Fig. 1. 1. Crescentic axehead from Jericho Tomb A 114.
2. Crescentic axehead from Tell el Hesi.

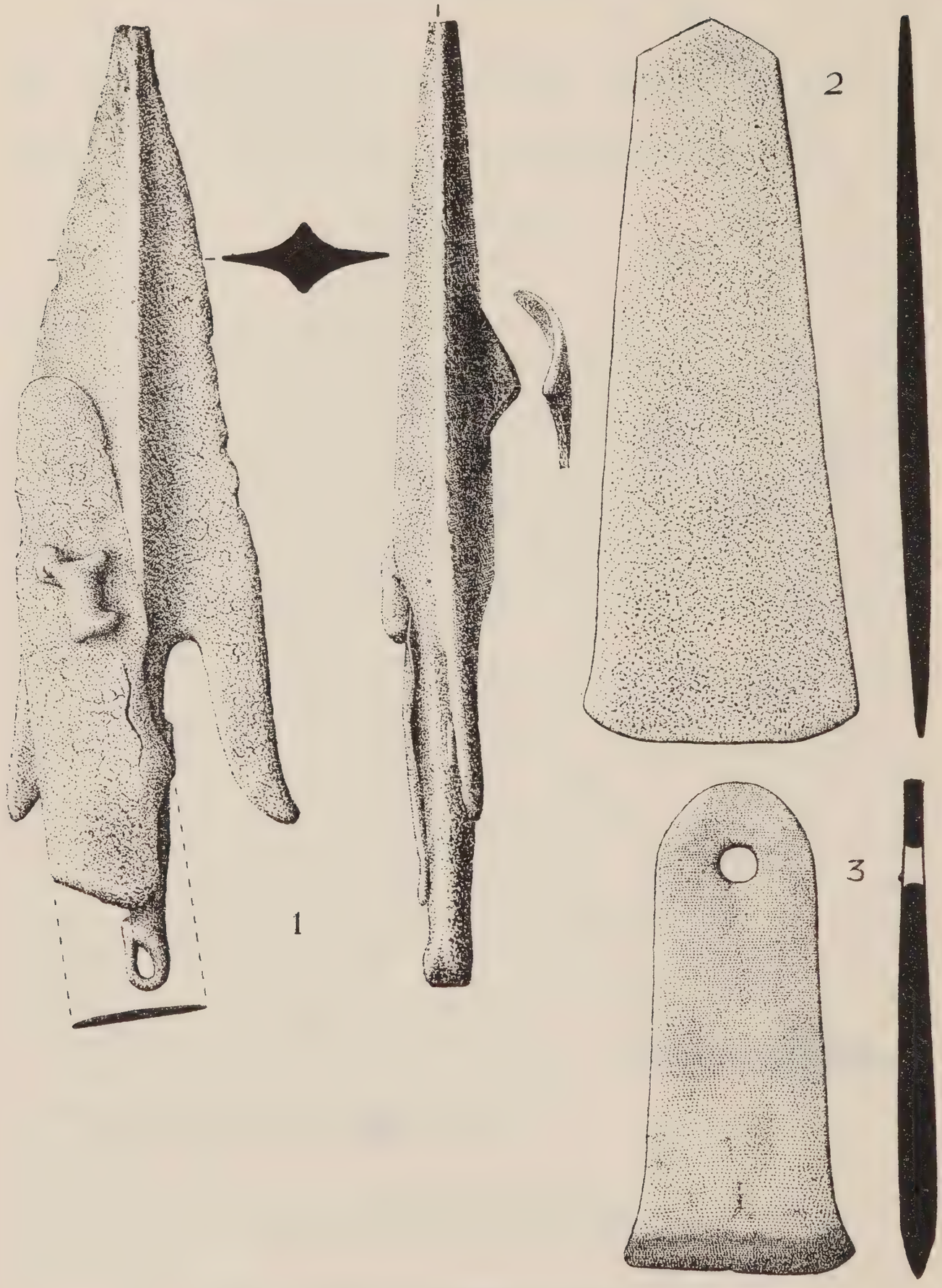

Fig. 2. Group of weapons from Tell el Hesi.

for hafting in the centre of the concave side. A pronounced knob on both faces at the junction of the tang and blade is the vestigial reflection of an original rivet joining the two elements. The two ends of the blade are oblique to the curve, and parallel to the line of the haft. The blade is comparatively thick, with the inner edge of the curve hammered to a very slight flange; the cutting edge is sharpened rather abruptly.

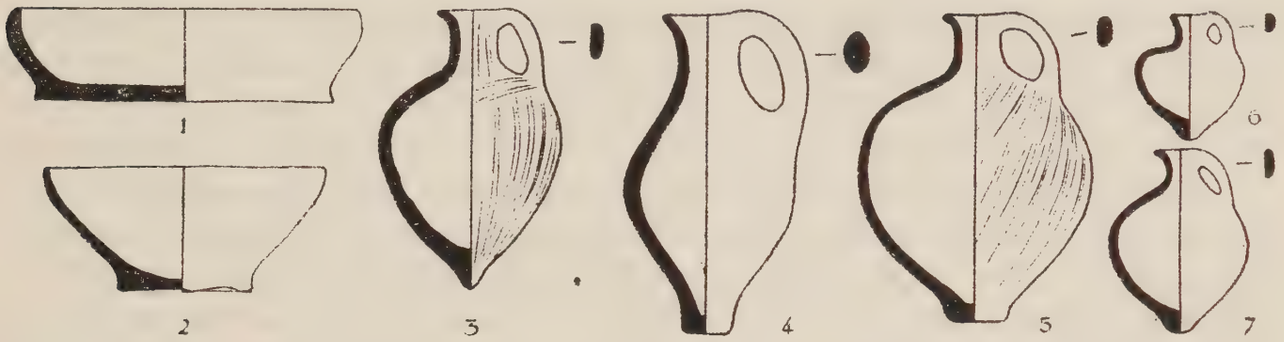

Fig. 3. Selected pottery from Jericho Tomb 114.

1. Dish. Greyish ware with small white grits. Base hand-made, wall wheel-made
2. Bowl. Brownish ware, dark red slip inside; many grey and white grits. Lower part hand-made, upper part wheel-made.
3. Juglet. Reddish ware, darker red slip, burnished vertically on body, irregularly horizontally on shoulder. Probably hand-made except for neck.
4. Juglet. Reddish brown ware, many small white grits. Apparently hand-made to girth, upper part wheel-made.
5. Juglet. Reddish ware, with some white grits, self slip, burnished obliquely. Lower part hand-made, neck and shoulder wheel-made.
6. Miniature juglet. Reddish ware, many fine sandy grits. Hand-made.
7. Small juglet. Yellowish ware, reddish slip. Lower part hand-made, neck and shoulder wheel-made.

The Tell el Hesi axehead (Fig. 1, 2) has a somewhat wider blade, thinner in proportion than that from Jericho, and the ends of the blade are not parallel to the line of the haft. Otherwise it is similar in all respects. In it, the tang survives to a greater length than in the Jericho axehead, though it is probably not complete, and it shows that the terminal of the tang was of thin metal and was curled round the haft. There is no trace of any rivet-hole.

The Tell el Hesi specimen was one of a group of weapons found by Bliss in the excavations which he continued for the Palestine Exploration Fund for four seasons after Petrie's initial compaign of 1890. The find[9] consisted of the axehead, three remarkable spearheads, a so-called knife, and four flat

9 *M.M.C.* Figs. 69-78, and p. 39.

axeheads. The crescentic axehead, a spearhead and two of the flat axeheads are in the collections of the Palestine Exploration Fund, now housed in the Institute of Archaeology, and are here re-published. Two points in Bliss's description, incidentally, may be corrected. The crescentic axehead *is* sharpened at the edge, and at least the two celts at the Institute have symmetrical cutting edges, and are therefore axes rather than adzes. The find was made in the lowest level of occupation on the mound, which can therefore now be dated to E.B. III, a useful addition to our knowledge of urban growth in Palestine. The house in which they were found was destroyed by fire, possibly the work of the invaders of the Intermediate Early Bronze-Middle Bronze period who brought the Early Bronze Age culture to an end over much of Palestine.[10]

The occurrences of crescentic axes are listed by Mrs Maxwell-Hyslop,[11] and are further described by Hillen.[12] He suggests that the earliest in the series is an example from Tell Agrab[13] of Early Dynastic II date (2800-2650 B.C.). In this the central tang and the extremities of the blade are all curled round the haft. Next in development he places the type of Early Dynastic III date (2650-2460 B.C.), from Ur and Kish,[14] in which the three points are fixed to the shaft by rivets instead of being curled round, obviously a technical improvement. This type develops easily, possibly via his so-called 'anchor' type[15] into the fenestrated Syro-Palestinian type, his 'eye' and 'duck bill' forms.[16] He suggests that Sumerian metallurgists were responsible for developing the crescentic form, while the fenestrated form developed therefrom after the break-up of the Sumerian industry in a Syrian centre, possibly near Byblos.

The Jericho and Tell el Hesi axeheads are somewhat aberrant examples, in that the extremities of the blade were not fixed to the haft. In the Tell el Hesi example, they cannot even have been in contact with the haft, from the evidence of where the tang starts to curl round; in the Jericho example, the break of the tang makes this uncertain, but if, as is possible, the break occurs at the point at which the curl starts, the oblique ends of the blade might have been rested against the haft.

An example which resembles the two under discussion, in that only the centre tang is fixed, is one from Soli-Pompeiopolis on the Cilician plain near Mersin.[17] In this, however, the tang is riveted and not curled. From the length of the curve of the blade, either the extremities of the blade must have

10 *P.E.Q.* 1952, pp. 65-68; 1953, pp. 10, 12-13; 1954, pp. 56-58.
11 *Iraq* XI, Type B1.
12 *Hillen*, pp. 211-212. I am indebted to Mrs Maxwell Hyslop for bringing this useful article to my notice.
13 *Ibid.*, Fig. 1.
14 *Iraq* XI, Pl. XXXVI. 2.
15 *Iraq* XI, Pl. XXXVII, 5.
16 *Ibid.*, Pl. XXXVII, 6-7, and list of occurrences, pp. 120-121.
17 *Soli*, Pl. IV. S. 3397.

been let in to the haft, or the haft must have had an angular projection. This same point applies to the other crescentic axe in the same group, which is of the typologically later type (Hillen's 'anchor' type) with a strengthening cross-piece on the tang which would have rested against the haft.

This group of bronzes from Soli, found as an isolated deposit without any associations, has been studied in detail by Bittel. He recognises that many of the types have a long life, particularly the tanged daggers and the flat axeheads. He considers that the overall majority of parallels suggests closest connections with the Til Barsib hypogeum,[18] dated by Mallowan to 2300-2100 B.C.[19] and with the Byblos foundation deposits, of Twelfth Dynasty date, opinion as to date within that period varying between 2000 and 1800 B.C. He claims that the resemblances are closest to the Byblos group, and therefore dates the Soli find 20th to 18th century. This does not carry conviction. The Til Barsib axe is possibly typologically earlier, with a rivet hole in each projection, but the Byblos example[20] is of the definitely later fenestrated type, while the Soli and Til Barsib group have the javelins,[21] which are missing at Byblos. In neither group are there the admixture of objects found at Byblos which link up with the Middle Bronze Age of Syria and Palestine, for instance the carinated metal vessels and short, veined daggers[22] which occur at Byblos. A date of *c.* 2200-2000 B.C. would best suit the Soli group, in the light of these points and those which will emerge in connection with the Ras Shamra chronology discussed below.

The Soli deposit has other points of interest in connection with the Tell el Hesi find. It includes among the very numerous flat axeheads the Hesi types (Fig. 2, 3 and M.M.C. Figs. 73-76), except the one with the pointed butt (Fig. 2, 2). It also includes spearheads which in their strong ogee-shaped midribs[23] resemble the remarkable Tell el Hesi spearhead (Fig. 2, 1), though they lack the latter's pronounced barbs.

Light is also thrown on the dating of the Palestinian objects, and of the crescentic axes, by a consideration of the finds and chronology of Schaeffer's Middle Ugarit (M.U.) 1 period and the allied Early Bronze-Middle Bronze period in Palestine. In Palestine the Early Bronze Age comes to an abrupt end in most places, with the appearance of entirely new groups of people,[24] nomadic in character. At Megiddo, there is not a complete break, but new groups appear, with a more sophisticated culture, and North Syrian connections, but nevertheless sufficient links with the more southern groups to make

18 *Stratigraphie*, Fig. 82.
19 *Iraq*, IX, p. 25 footnote 1.
20 *Stratigraphie*, Fig. 61.
21 *Soli*, Pl. IV.
22 *Stratigraphie*, Fig. 69, N. and 61, N. and P.
23 *Soli*, Pl. IV.

their contemporaneity certain. One group, however, Tomb 1101-2 somewhat the earlier, overlaps E.B. III, and contains a swollen-headed toggle pin,[25] of a type identical with that characteristic of Schaeffer's 'Porteurs de torques'.[26] Another group, later but overlapping, that of the Shaft Tombs, contains a number of pins,[27] which can be exactly paralleled at Brak,[28] where they are dated by Mallowan to 2200 B.C., and also pottery of Syrian affinities which can be best dated at Mishrifé–Qatna beneath a temple of Ninegal dated by tablets to 2200 B.C. A further chronological link is the occurrence in this phase in Palestine of javelins[29] similar though not identical, with those from Soli and Til Barsib which, as has been shown, are to be dated 2200-2000 B.C. and 2300-2100 B.C. respectively. Some of the dagger types are also similar. Some time-lag may possibly be allowed for Palestine, but an initial date of 22nd century B.C. is clear, and a terminal date of 20th century B.C. is given by the supersession of the culture by the full Middle Bronze I, which can be linked with Twelfth Dynasty finds at Byblos.

The link between the Palestinian E.B.-.M.B. phase and Schaeffer's Middle Ugarit 1 is clear both from the pins and from pottery.[30] This would imply a raising of Schaeffer's date of 2100-1900 B.C. which in fact seems necessary from the Ras Shamra evidence. The sequence there is a fire, followed by Early Ugarit (E.U.) 3, succeeded by a level of decayed mud-brick, into which the M.U. 1 graves are dug; above this was the intentional levelling for the Temple of Baal, which received offerings from Twelfth Dynasty Egypt in the 20th century B.C. E.U. 3 contained Khirbet Kerak ware, which is firmly dated from about the middle of E.B. III in Palestine, a period dateable to the Fifth-Seventh Egyptian dynasties, i.e. 27th-24th centuries B.C. The fire must therefore fall within the first half of the 3rd millennium, and E.U.3 be dated *c.* 2500-2300 B.C. The succeeding decayed mud-brick level may represent a period of abandonment, and M.U. 1 may start 2200 B.C., ending *c.* 2000 B.C., before the date of the temple which would fit the evidence given in the last paragraph. Schaeffer's dates of 2100-1900 B.C. should therefore be raised by about a century.

Among the equipment introduced by the 'porteurs de torques' of M.U. 1 was the fenestrated axehead, the shaft-hole development of the crescentic axehead. That this type of axe developed in Syria is generally agreed. Two Palestinian finds confirm its attribution to this period. One comes from the

24 See *P.E.Q.* 1953, pp. 10 and 12-13 and *P.E.Q.* 1954 for discussion of Jericho evidence and a forthcoming article for discussion of T. Ajjul groups (Petrie's 'Copper Age').
25 *Megiddo Tombs*, Pl. 86. 2.
26 *Ugaritica* II, Chap. II.
27 *Megiddo Stages*, Fig. 20.
28 *Iraq*, XI, pl. XXXI.
29 *T. Ajjul* I, Pl. XIX, 48-9. Also found at Tell Duweir.
30 Compare *Ugaritica* II, Fig. 19 and *T.B.M.* Ia, Pl. 3.

Austro-German excavations at Jericho, and consists of a find of one fenestrated axe and a number of flat axes in a jar of E.B.-M.B. type.[31] The second is from Megiddo Tomb 84c.[32] This was a tomb of the shaft type there associated with the E.B.-M.B. period, but in which only some bronzes survived. Two of these are a spearhead of the type noted by Schaeffer as characteristic of his M.U. 1,[33] with a socket running up into a rounded mid-rib. The Megiddo ascription to M.B. 11 or L.B. 1 is therefore wrong.

The fenestrated axehead may not appear at the beginning of M.U. I, since it is not present in a number of groups published by Schaeffer, but it is certainly well-established within the period. It certainly continues into the 20th century, for it is found in foundation deposits at Byblos of Twelfth Dynasty date. These deposits, especially deposit 'd' from Bâtiment II,[34] represent an overlap between Schaeffer's M.U. 1 and the full Middle Bronze Age. Many of the types are typical of M.U. 1, for instance the swollen-headed pins, the torcs and the fenestrated axehead, but deposit 'd' also includes a short, broad-shouldered, veined dagger, of the type characteristic of M.B. 1 in Palestine[35] and a carinated metal vessel which is the prototype of the M.B. 1 pottery bowls, which are fully established in Byblos during the Twelfth Dynasty, and are also typical of M.B. 1 in Palestine. The elongated fenestrated axe (Hillen's 'duck bill' type) also occurs in M.U. 1,[36] but continues into the full Middle Bronze Age.[37]

The fenestrated axehead has thus a range of *c.* 2100 to 1900 B.C. with the elongated form continuing to perhaps 1800 B.C. This accords well with the dating of its typological predecessor, the crescentic axe. The type with the rivetted tang should on the Ur, Til Barsib and Soli evidence fall within the period 2300-2100 B.C., and the type with the tang curled over should on the Jericho evidence be somewhat earlier, perhaps 2400-2200 B.C.

The other Tell el Hesi weapons may be dismissed more briefly. The flat axeheads have a long history, as Mrs Maxwell-Hyslop has shown.[38] The type with the hole in the butt occurs at Til Barsib, Soli and in the 20th century at Byblos. At Megiddo they seem to occur also in the Middle and Late Bronze Age, but elsewhere they are rare after the Early Bronze Age.

The partial analogy of the spearhead with Soli examples has already been noted. Mrs Maxwell-Hyslop has also noted[39] a parallel in a spearhead from

31 *Jericho*, E. Sellin and C. Watzinger, Leipzig 1913, Fig. 105.
32 *Megiddo Tombs*, Pl. 163.
33 *Ugaritica* II, Fig. 18, 1-2.
34 *Stratigraphie*, Fig. 61.
35 e.g. *Megiddo Tombs*, Pl. 118. 5 and Pl. 122. 9.
36 *Ugaritica*, Fig. 25. 1.
37 e.g. *Ibid*, Fig. 73.
38 *Iraq*, XI.
39 *Iraq*, XV.

Judeidah, where it is associated with Khirbet Kerak ware, as, through the Jericho link, it can also be in Palestine.

The Tell el Hesi group can now therefore be firmly dated to Early Bronze III, with, since Khirbet Kerak ware probably does not appear at the beginning of the period, emphasis on the later part. It probably therefore falls within the period 2500-2300 B.C.

ABBREVIATIONS

T.W.	W. M. Flinders Petrie, *Tools and Weapons*, 1917.
Iraq XI	Rachael Maxwell-Hyslop, 'Western Asiatic Shaft-Hole Axes', in *Iraq* XI, London, 1949.
Soli	Kurt Bittel, 'Der Depot von Soli Pompeiopolis', in *Zeitschrift für Assyrologie und vorderasiatische Archäologie*, (Berlin), XLVI. 1940.
Hillen	C. Hillen. A Note on Two Shaft-Hole Axes, in *Bibliotheca Orientalis*, X, Leiden, 1953.
P.E.Q.	*Palestine Exploration Quarterly*, London.
Wright	G. Ernest Wright, *The Pottery of Palestine from the earliest times to the end of the Early Bronze Age.* American Schools of Oriental Research, New Haven, 1937.
M.M.C.	F. G. Bliss, *A Mound of Many Cities, or Tell el Hesy Excavated*, London, 1898.
Stratigraphie	C. F. A. Schaeffer, *Stratigraphie Comparée et Chronologie de l'Asie Occidentale*, Oxford, 1948.
Megiddo Tombs	P. L. O. Guy, *Megiddo Tombs*, O.I.P. XXXIII, Chicago, 1938.
Ugaritica II	C. F. A. Schaeffer, *Ugaritica II*, (Mission de Ras Shamra, Vol. V), Paris, 1949.
Megiddo Stages	R. M. Engberg and G. M. Shipton, *Notes on the Chalcolithic and Early Bronze Age Pottery of Megiddo*, S.A.O.C. 10, Chicago, 1934.
T.B.M. Ia	W. F. Albright, *Annual of the American Schools of Oriental Research* XIII, The Excavation of Tell Beit Mirsim.
T. Ajjul	W. M. Flinders Petrie, *Ancient Gaza*, London, 1931.

Ay and the Chronology of Troy

By M. W. Prausnitz

Among the spectacular finds excavated in 1933-35 at Ay (Et-Tell) in Palestine by the late Mme. J. Marquet-Krause[1] was a number of alabaster vessels. Mme. Marquet-Krause, as well as the late J. L. Starkey, immediately recognised them as identical with early Egyptian alabasters from the Second and Third Dynasties.[2] The manufacture of these types of alabaster bowl was discontinued during the Fourth Dynasty. We have therefore for Ay a *terminus post quem*. The excavator had given much thought to the chronological implications of these finds[3] and had apparently reached the conclusion that the alabaster vessels had passed on from an earlier sanctuary to the last, namely sanctuary 'A'. This sanctuary 'A', it is now securely established, was, like the whole of Ay, over-run and utterly destroyed as early as the third phase of the Early Bronze Age of Palestine (E.B. III).

Professor Albright, referring to the same alabaster vessels, attributed them to the Fourth Dynasty. During the Fifth and Sixth Dynasties Egypt lost control over Syria and Palestine.[4] Imperial armies were sent to re-establish the rule of Egypt. An example is the campaign into Palestine, into the country of the 'sand dwellers' of general Uni during the reign of Pepi I (2375-2350 B.C. E.).[5]

Against this background of decay of the Old Kingdom in face of strong Northern pressure we have to assess the other group of unusual finds discovered at Ay.[6] In the last occupation level and in the thick layer of burning and ashes which marked the end of the fortress of Ay, two polished stone hammer-axes were found[7] in chamber 5 and 7 of the so-called palace (Plate I, Fig. 1).

They were found together with mace-heads and eight enormous storage jars with plastic decoration and flaring rim.[8] At the time of the excavation Mme. J. Marquet-Krause noted the striking difference between the storage jars with collared rim and upright neck of sanctuary 'B' and the storage jars with plastic or incised decoration and flaring rims found in the level of sanctu-

1 Marquet, Krause: *Les Fouilles d'Ay*, Paris, 1949.
2 G. Reisner: *Mycerinus*, 1931; G. E. Wright: *The Pottery of Palestine from the earliest times to the end of the E.B. Age*, New Haven, 1937, p. 90.
3 *Ay*, p. 19, note (i).
4 W. F. Albright: *J.P.O.S.* XV, 1935, pp. 209-12.
5 *Ancient Near Eastern Texts* ed. Pritchard, p. 227.
6 I am greatly indebted to Prof. Stuart Piggott who, as early as 1946, drew my attention to the Ay axe hammers. They are also mentioned by R. W. Hutchinson in *P.P.S.*, 1951.
7 *Ay*, index Nos. 68, 302.
8 *ibid.*, p. 11.

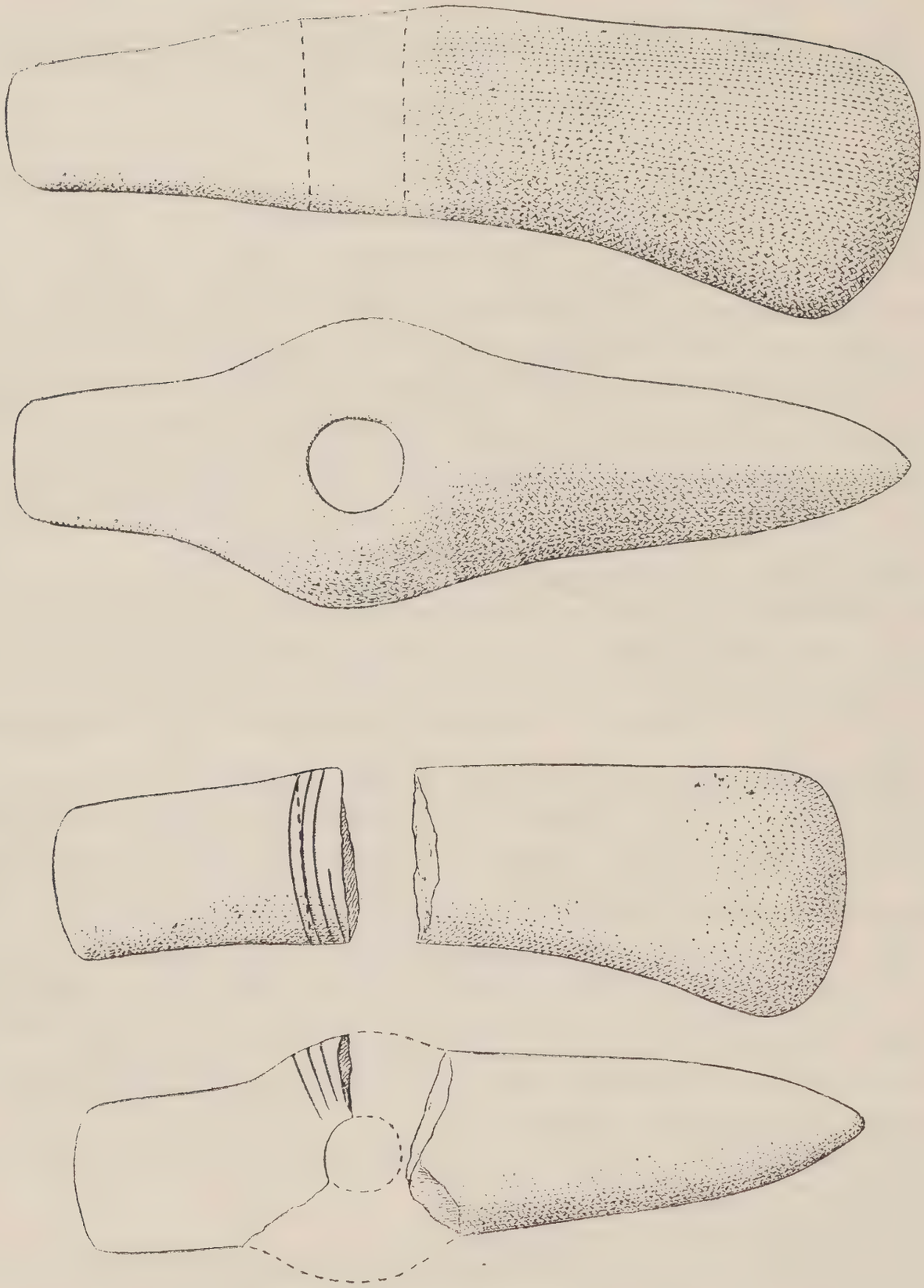

Fig. 1 Hammer-axes from Ay (3/4).

ary 'A'. Indeed, it should be repeated, the pottery of Sanctuary 'A' as well as the last occupation level of Ay can safely be placed within the relative chronology of the Palestinian Early Bronze Age. The stone axes, therefore, also belong to the third phase of the Early Bronze Age in Palestine (E.B. III). They are now in the Palestine Archaeological Museum (Nos. 68/36546, 302/36550) and are described as follows: 36546—well polished axe with carefully polished shaft-hole. The expanded portion round the hole is imitated from metal types where the expansion is due to the technical process. 'Its measurements are 170 x 35 mm. The second axe is a hammer-axe similar to 36546. The ridges outside the shaft-hole are made in imitation of string with which the axe was fastened to the handle.' The stone hammer-axe is a stranger, an utter stranger, in Palestinian archaeology and the nearest parallels are to be found in Western Anatolia. The Anatolian hammer axes and especially the famous Trojan axes from Treasure L have often been discussed. We shall revert to them later.

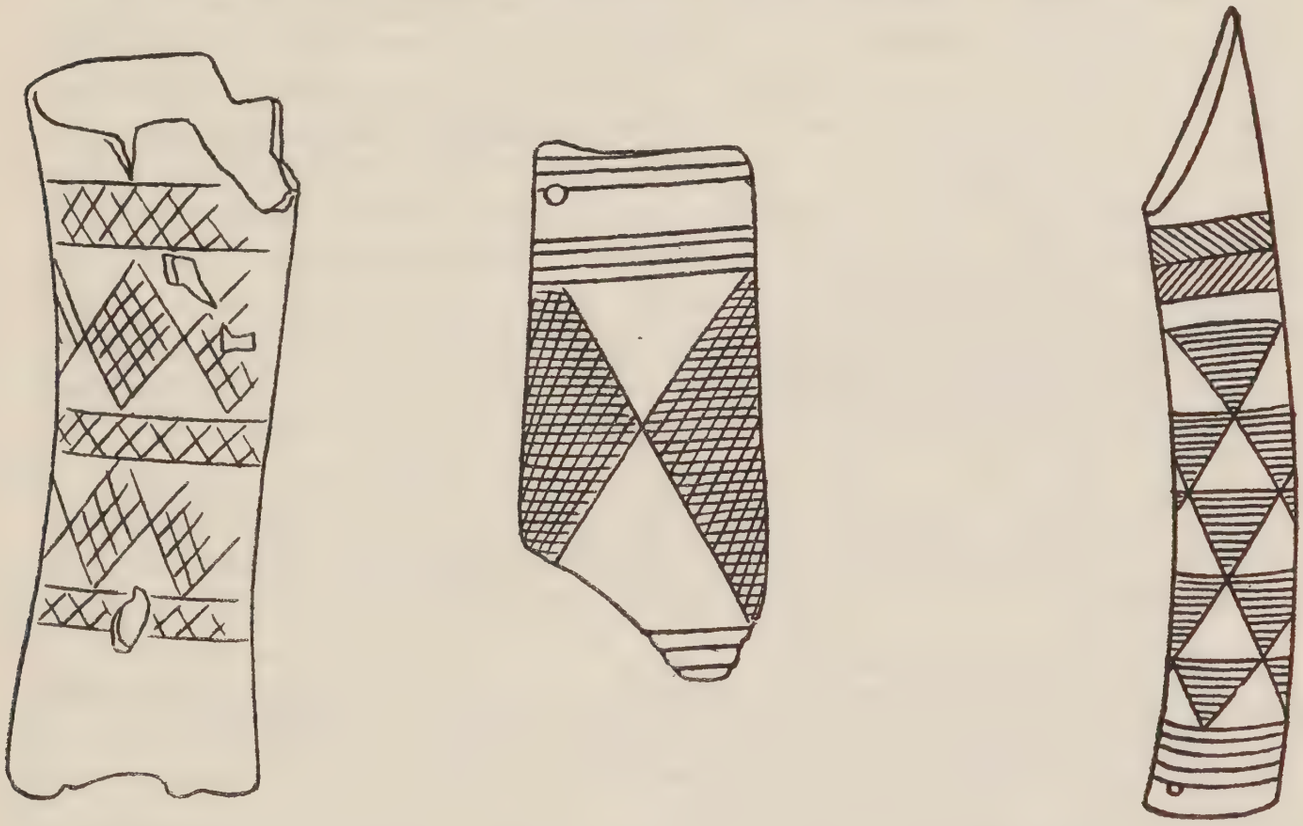

Fig. 2. Bone handles from Qualaat er-Rouss and Megiddo and bone tube from Cyclades.

The Ay excavations also revealed another remarkable link with the North, namely bone handles. In a niche of the Southern wall of sanctuary 'A', which was filled with ashes and bones, were found one ivory knife handle (Pl. I, 4)

and three bone handles,[9] together with 'un gobelet égyptien'. The handles are very handsome specimens akin to the 'bone tubes' with lozenge designs mentioned as examples of Cycladic art.[10] There is a striking similarity in design and workmanship between the Syro-Palestinian examples and those from the Cyclades (Fig. 2). Yet these bone handles by themselves can hardly be accepted as proof of either direct or indirect links. Their history goes back to predynastic Egypt, if not still farther. The Egyptian examples, however, became much more elaborate and refined. In addition to similarity of style and decoration, there is one further convincing argument: the use of ivory, one of the most highly priced commodities of prehistoric trade. In the ancient Mediterranean world it came either from Africa including the Nile valley or from RETENU, ISY or NIY, that is from Syria and Assyria, respectively.[11] Bone or ivory handles nearly identical with those from Ay have been found at Kuneitira-Tell Eklatiya near Tiberias,[12] at Kh. Kerak, 10 km. South of Kuneitira,[13] at Megiddo,[14] in Syria at Byblos,[15] at Ras Shamra,[16] at Qualaat er-Rouss[17] (Fig. 2). The stratigraphical position of all handles except those from Megiddo and Byblos[18] is quite clear and should be quoted in the words of Professor Schaeffer:[19] 'Il importe d'observer que les fragments de la poterie dite Kh. Kerak ainsi qu'un manche en os gravé identique à celui du Qualaat er-Rouss ont été trouvés par nous â Ras Shamra dans la même situation stratigraphique.' At Kh. Kerak (Beth Yerach) itself the handle fragment belongs to the Early Bronze Age layer containing the pottery which carried the name of this magnificent tell. It is worth while to recall the distribution of Kh. Kerak pottery: from Jericho in the South of Palestine up to the Plain of Antioch in the North.[20] Moreover the fact that Kh. Kerak ware belongs to the Palestinian E.B. III, though not necessarily to the beginning, is, one might say, axiomatic. At Tabara el Akkrad, Kh. Kerak ware comes from Level IV and upwards,[21] which levels seem to equate with the beginning of an Early Dynastic horizon in Mesopotamia and with the upper part of Judeideh XI. Kh. Kerak ware ha

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9 *Ay*, index Nos. 1533, 2251, 2349, 2350.

10 V. G. Childe: *Dawn of European Civilisation*, p. 55, ed. 4. I should like to thank Professor Childe for confirming that these Cycladic tubes, unlike the handles, were used as containers for paints.

11 L. Woolley: *A Forgotten Kingdom*, pp. 74-75, 144-5.
A. Lucas: *Ancient Egyptian Materials and Industries*, 3rd ed., p. 39.

12 Excavations by the Dept. of Antiquities, Israel.

13 Excavations by the Dept. of Antiquities, Israel. I am indebted to Mrs Guy for showing me the fragment found by the late Colonel Guy.

14 O.I.P., *Megiddo*, II. Pl. 196.

15 M. Dunand: *Fouilles de Byblos*, Atlas.

16 C. Schaeffer: *Stratigraphie*, p. 41.

17 A. M. H. Ehrlich: *Early Pottery of the Jebeleh Region.*

18 The handles and tubes appear at two different periods: first in the E.B. and later in L.B. and onwards.

19 C. Schaeffer: *Stratigraphie* . . . p. 41, 245.

20 Braidwood, O.I.P.: *Mounds in the Plain of Antioch.*

21 Sinclair Hood: *Anatolian Studies*, i, 1951, p. 114.

notoriously strong affinities with the North and has been connected with analogous chalcolithic pottery of Eastern Anatolia as far north as the Kura river in the Southern Caucasus.[22]

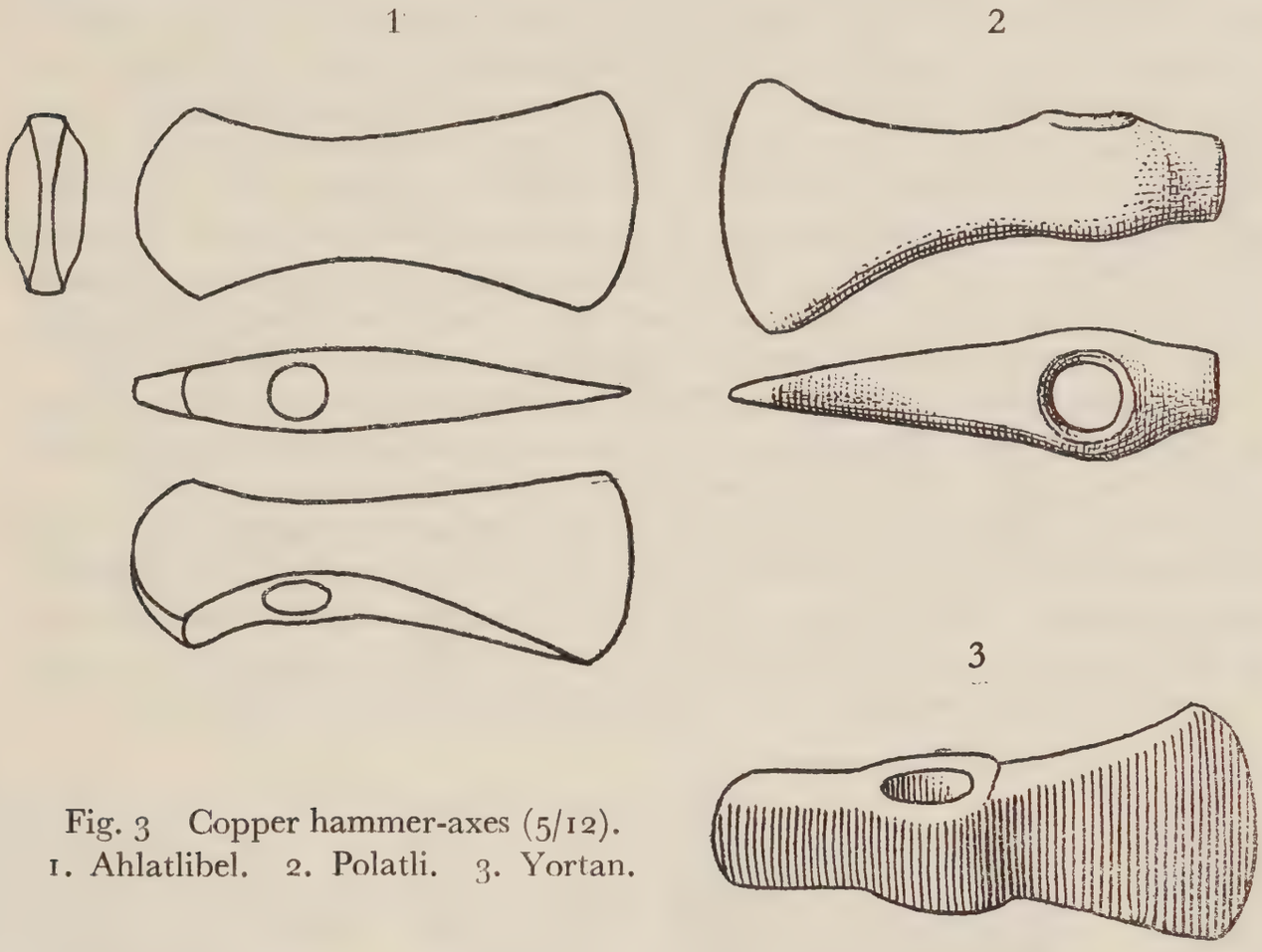


Fig. 3 Copper hammer-axes (5/12).
1. Ahlatlibel. 2. Polatli. 3. Yortan.

It is beyond the scope of the present study to discuss the intriguing implications, chronological and otherwise, suggested by the appearance of Kh. Kerak pottery in the Levant. Suffice it to say that the bone and ivory handles appear first in the Levant just before and around the time of the advent of Kh. Kerak pottery (i.e., E.B. III). However—like the hammer-axes and unlike Kh. Kerak pottery—they have a distribution pointing to a north-western source of origin and are found without Kh. Kerak pottery at Ay and Byblos in Western Anatolia and the Cycladic Islands.

The Ay stone hammer-axes do not belong to that group of Western Asiatic shaft-hole axes which has a shaft hole at one extremity of the axe and no

22 The Anatolian analogies of Kh. Kerak ware have been discussed by Sinclair Hood, *Anatolian Studies* I, p. 116-9. K. Bittel, *P.Z.* XXXIV—XXXV. p. 142. R. Amiran, *I.E.J.* II (1952) p. 89-103. L. Woolley, *A Forgotten Kingdom*, 1953, p. 31-7. W. Lamb, *Anatolian Studies IV* (1954), pp.21-32.
They all, with the exception of Mrs Amiran, agree that the closest parallel for Kh. Kerak are found primarily in Eastern Anatolia.

elaborated butt or hammer. The Ay axes have a drooping blade (asymmetrically splayed).[23] They resemble horn or wooden prototypes and seem to go back to a typological ancestry quite different from the Western Asiatic shaft-hole axes classified by Maxwell-Hyslop. There is one exception, namely, type II[24] of which only one specimen is listed, the so-called earliest Anatolian shaft-hole axe made of copper from Ahlatlibel and, significantly, it is described thus: 'there is no attempt to extend the socket down the shaft and the butt of the blade is curved and could have been used as a hammer. It is not a form well suited for casting in metal and the smith must have had a stone prototype in mind.'[24] (See also Fig. 3). At Ahlatlibel again pottery having analogies with Kh. Kerak pottery was found, and Bittel dates the finds to the middle, and possibly somewhat later than the middle, of the third millenium B.C.[25]

Another metal shaft-hole axe comes, it is believed, from the early Copper Age level at Polatli. This axe has also a hammer end and seems to belong to a grave group, in which a cup reminiscent of the famous Alaca gold cup was found.[26] From Yortan there is another copper axe with a hammer end which is now in the Louvre. From the graves at Alaca metal axes (copper and silver) were recovered. Also at Alaca, as well as at a number of other Anatolian sites, we find hammer-axes of stone which are similar to the Ay specimens (see table A), yet still more important are the stone axes found at Alishar and Troy.

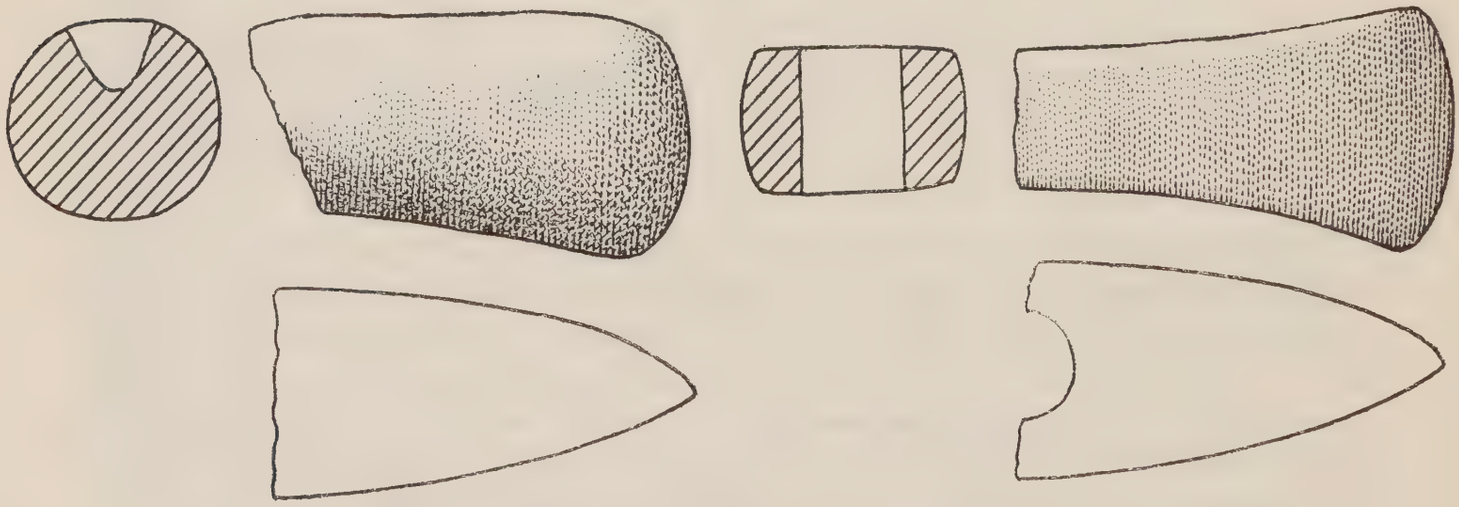


Fig. 4. Axes from Thermi III (1) and V (2).

Alishar has produced a number of axes, a great number of bone tubes of a rather primitive type, and pottery having affinities with Kh. Kerak ware. Bone tubes, axes and ware akin to Kh. Kerak begin at Alishar with levels 14-13.[27] Hammer

23 V. G. Childe: *Prehistoric Migrations*, Oslo, 1950, p. 113.
24 R. Maxwell-Hyslop: *Iraq* XI, pp. 90-129.
25 K. Bittel: in *A.f.O.* XI pp. 38-40.
26 Seton Lloyd, Nuri Gökce: *Anatolian Studies*, I. pp. 60-61. Fig. 14.
27 *Alishar Hüyük O.I.P.* Vol. XXVIII) (e 1825 a hammer axe), (e 1832 a bone tube).

axes, however, and bone tubes have a long range of incidence. Some bone tubes or handles are as late as post Alishar II (which is of course later than Alishar III). Polished hammer-axes seem to be extant well into Alishar III. The

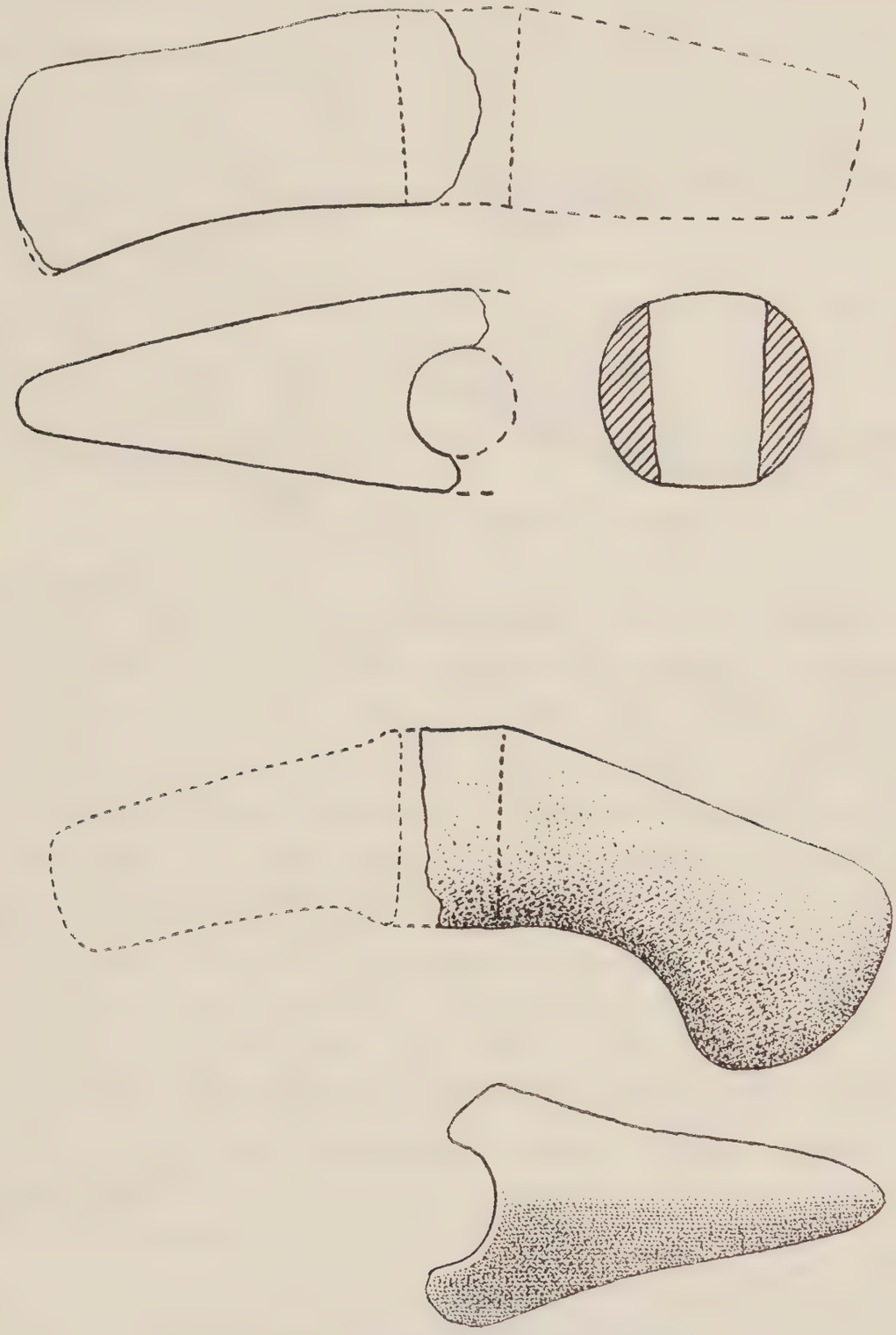


Fig. 5. Axes from Troy I (3/5).

fragmentary ceremonial shaft-hole axe (e/369) of green polished stone, a parallel to the Ay axes, was retrieved from a refuse layer containing Alishar 'Copper Age' and 'Early Bronze Age' finds.[27] Alishar level 14 has been carbon-dated and the result was 4519 ± 250 years, thus giving about 2500 B.C.[28]

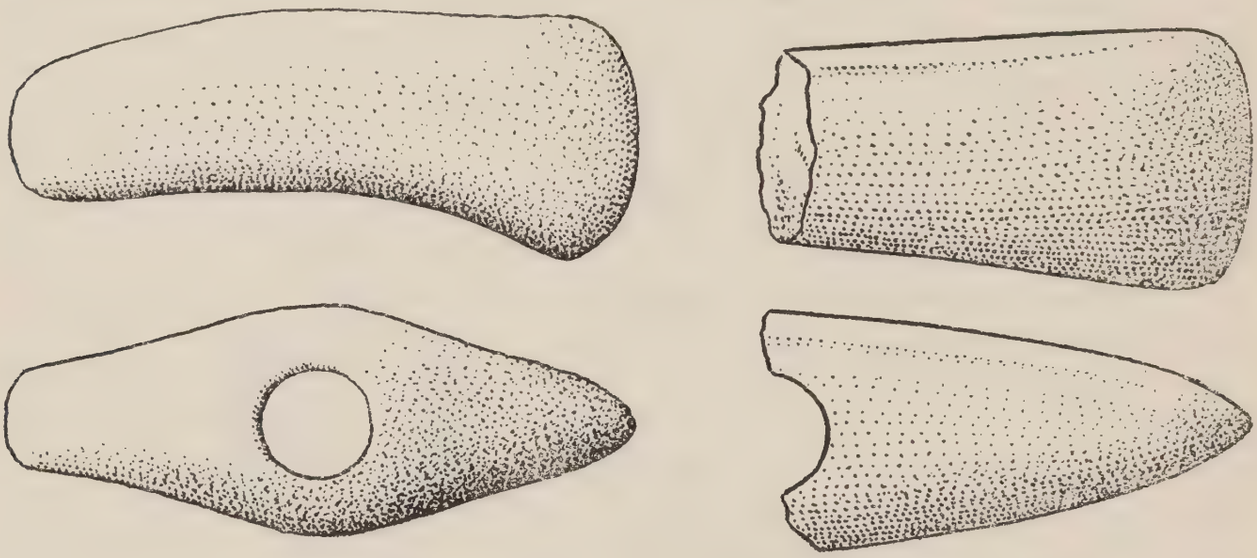


Fig. 6. Axes from Troy II (5/8).

At Troy and Thermi stone hammer-axes were found in carefully observed stratified sequences.[29] Recent publications of the excavations at Troy[39] have given assurance and dispersed many doubts (Figs. 4, 5, 6). At Thermi, as well as at Troy, hammer-axes of stone begin to appear in the earliest levels. The axes which most resemble the polished and probably ceremonial Ay types come from Treasure L at Troy. A considerable amount of literature has grown up around Treasure L axes because of their connection with, and resemblance to, the Borodino hoard and certain North European and Caucasian axes.[30] We cannot here discuss the chronological difficulties created by European chronology, but the excavations during the years 1932-1938 show that Treasure L belonged to the end of Troy II. No stone hammer-axes are found at Bronze Age Troy after Troy II g (see chart 1). The bone handles and tubes offer corroborative evidence. In the Cyclades, their apparent centre of distribution, and in Anatolia, they have a wider range of incidence than in the Levant, as, indeed, may be expected. The Troy tubes or handles are invariably of bone, with one exception, namely, a knife-handle made of ivory, found in Troy II g. Thus Troy must have had access directly or indirectly to the upper Euphrates, if not Egypt. Indeed we have more evidence of Assyrian connections with Troy

28 W. F. Libby: *Radiocarbon Dating*, p. 71.
29 Thermi: W. Lamb, *Excavations at Thermi in Lesbos*.
Troy: Blegen and others, *Troy*, I-III, Philadelphia, 1953.
30 N. Aberg: *Bronzezeitliche und Früheisenzeitliche Chronologie*, Stockholm, 1932.
C. Schaeffer: *Stratigraphie Comparée*, Oxford, 1948, p. 243.

at that period, as indicated not only by the sliding gold beads with four spirals in contiguous pairs at either end which also appeared in a grave at Assur dated about 2300 B.C.[31] and in silver at Tell Brak[32] but also by cylinder seals.[33]

The Troy treasures show the wide connections (lapis lazuli, beads, amber, etc.) Troy II (f—g) had established within the ancient world. The Ay finds for once give a unique opportunity of using Anatolian stone hammer-axes, bone handles and tubes, and ivory from the upper Euphrates or Egypt as cross-links and cumulative evidence in suggesting a date for Troy II (f g). The Ay date[34] arrived at on the strength of Egyptian and Palestinian Chronology is around the Fourth to Fifth Dynasties of Egypt or around 2400 ± 100 B.C.[35]

31 E. Dullo; 'Die Kaukasischen Aexte der Bronzezeit', p. 120. *P.Z.* XXVII, p. 120.
32 M. E. L. Mallowan, *Iraq*, IX (1947), pp. 171-6.
33 Bittel in *A.f.O.*, 13, 1938, pp. 299-307; on Troy and Alishar cylinder seals, note also Frankfort: *Cylinder Seals*, 1939, p. 227.
34 2400 B.C. is Blegen's tentatively suggested date for Troy II (g). (*Troy*, I. p. 41), based on Early Aegean and Cretan chronology and also on the life expectancy of the phases and levels of the tell using the Mycenaean age as *terminus ante quem*.
35 I am very grateful to Professor V. G. Childe for reading the manuscript and for offering me his kind guidance and most constructive criticism.

CHART I

Troy I: (3+4)	*Early*	*Middle*	*Late*
Hammer axes	1	1	–
Handles	1	1	–
Tubes	–	1	–

Troy II: (9+10)	*IIa*	*IIb*	*IIc*	*IId*	*IIe*	*IIf*	*IIg*
Hammer axes	–	–	–	–	–	3	1
Handles	–	–	–	–	–	–	1
Tubes	–	–	–	1	–	–	4
Ivory handles	–	–	–	–	–	–	1
Ivory implement	–	–	–	–	–	–	1
Ivory awl	–	–	–	–	–	1	–

Troy I-V: (24+25)	*I*	*II*	*III*	*IV*	*V*
Hammer axes	2	4	–	–	–
Handles	2	1	–	3	–
Tubes	1	5	4	2	
Ivory	–	3	–	–	–

As per Carl W. Blegen and others. Troy settlements, Vols. I, II. 1950, 1951.

TABLE A

	Site	*Stone Hammer axes*	*Copper Silver*	*Bone Handles*	*Ivory*	*Khirbet Kerak Ware & Anatolian Related Ware*	*Level*
Western Anatolia	Troy	X	–	X	X	–	II f-g
	Thermi	X	–	X	–	–	II-IV
	Akarkoey	X	–	–	–	–	
	Larissa	X					
	Asphedios	X	–	Unstratified			
	Cavdarhissar	X					
	Yortan	X	(Copper)	do			
Pisidia	Kusura	X	–	X	–	?	B
	Kornekoey	X	–				
Central Anatolia	Alaca	X	(Copper & Silver)*	–		X	Graves
	Alishar	X	–	X	–	X	14 & onwards
	Ahlatlibel	X	(Copper)	–	–	X	
	Polatli	X	(Copper)	–	–	X	Phase I
Levant[1]	Ay*	X	–	X	X	–	E.B. III
	Ras Shamra	–	–	–	X(?)	X	E.U. 3.
	Qualaat er-Rouss	–	–	X	–	X	
	Hama	–	–	X	?	X	K
	Kuneitira (Tell Eklatiya)	–	–	X	X	X	E.B. III
	Kh. Kerak (Bet Yerach)	–	–	X	?	X	E.B.
	Megiddo[2]	–	–	X	X	X	*See note*

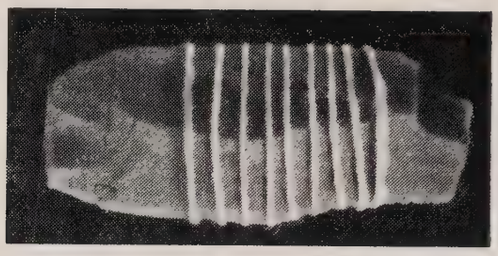
* According to Bittel, hammer axes have been found at: Gazianteb, Agrab and Kish. All belong to the middle of the third mill. B.C. Their presence at Gazianteb is particularly important in view of Gazianteb's geographical situation on the way from the upper Euphrates to Anatolia in the North and the valleys of the Orontes and Amuq in the South.

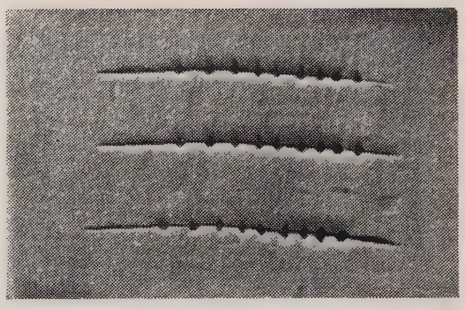
1 Bone handles (or tubes) appear in the Levant at two different periods. First in E.B. and again in Late Bronze Age contexts and later. For this reason Byblos, Gezer handles are not listed, as their stratification is uncertain.

2 The Megiddo bone handle comes from level XIII, square D 594 (M.B.). The area, however, is not well defined and was not sealed. It is likely to be earlier.

Battle axes and ivory handle from Ay.

Beaker No. 2 from Lion Point, Clacton (1/1).





Flake wrapped with thread and its impression on plasticene (1/1).

Beaker No. 8 from Lion Point, Clacton (1/3).

Late Beaker Pottery from the Lyonesse Surface and the Date of the Transgression

By I. F. Smith

Mr S. Hazzledine Warren has recently drawn to the writer's attention some unpublished pottery from his excavations at Lion Point, Clacton, and has kindly given permission for its publication here.

It has previously been held that the Lyonesse transgression afforded a fixed horizon, separating the arrival in South-eastern England of the makers of B and A beakers respectively.[1] Although the fragments of the handled A beaker illustrated in Fig. 2, 2 lay in an uncertain relationship to the submerged surface, the pottery from Site 114 (Figs. 1, 2, and Pl. II) lay upon it. If the significance of these beakers has been correctly interpreted, they imply a relatively later date for the beginning of the transgression than that generally accepted and, in addition, a discrepancy between the geological successions on the Essex coast and in the Fenland.

Owing to the special kind of stamp used to ornament certain of the sherds from Site 114, it is possible to single out a small group from the great mass of beakers, the Anglo-Dutch relations of which are so often discussed, to find specific relationships not only in the Netherlands, but in North-western Germany and in Scandinavia as well, and to place the chronology of pot-beakers and certain rusticated wares on a firmer basis. A further consequence of the evidence to be set forth is the possibility of correlating, on purely archaeological grounds, the Lyonesse trangression with a marine transgression of the banks of the Elbe and its tributaries near Hamburg. On the Elbe the beginning of this submergence is closely dated to Late Neolithic/Bronze Age I and it is suggested that on the coasts of South-eastern England the onset came very near the time of the earliest Wessex graves.

1 Piggott, S., in Warren *et al.*, *P.P.S.*, ii (1936), 191, 209; following him, Godwin, H., 'Studies of the Post-Glacial History of British Vegetation', I, II, 402 (*Phil. Trans. Roy. Soc. Lon.*, 1938); *ibid.*, III, IV (1940), Fig. 27; Childe, V. G., *Prehistoric Communities of the British Isles* (1949), II, 88; Zeuner, F. E., *Dating the Past* (1950), 98; Piggott, *Neolithic Cultures of the British Isles* (1954), Fig. 64, places the submergence in his Middle Neolithic period.

DESCRIPTION OF THE POTTERY

The Pottery from Site 114, Figs. 1 and 2 and Pl. II.

Mr Hazzledine Warren has supplied the following account of the circumstances in which he found the pottery:

> 'Site 114 was situated near to mid-tide level, and was thus well within the range of the submergence. It was a typical "cooking-hole", and 3 feet diameter and over 1 foot deep. In addition to the pottery, the contents consisted of a few large pieces of charcoal, teeth and part of the lower jaw of a young ox, part of the tusk of a boar, some two dozen rounded lumps of burnt clay, nine small irregular cores, 37 small to very small chips, and four thumb-nail scrapers. The general assemblage, apart from differences in form and ornament of the beakers, is identical with that of other special beaker sites previously recorded from Stone Point and Dovercourt (*Journ. R. Anthrop. Inst.*, 42 (1912), 119). It is hoped to describe these associations more adequately on another occasion, and to correct one or two errors in the 1912 description.
>
> 'This small group (114) needs comparison with the larger Dovercourt site yielding 88 small irregular cores, 295 small to very small chips (spalls) struck from them, 71 thumb-nail scrapers (nearly 16 per cent of the total flint-work), no more than one or two poor scrapers of more ordinary size, two hammerstones, and a few other items. It seems clear that the main intention of the flint industry was the making of thumb-nail scrapers from the most suitable of the chips: the question is—for what purpose?
>
> 'It is true that a few thumb-nail scrapers occur in other associations on Lyonesse, but only as subordinate items. The special assemblage under consideration appears to suggest some specialized trade (such as that of the potter)—some craft in which neither the scraper of ordinary size nor the keen-edged flake-blade were used to any appreciable extent. No associated axe- or arrow-heads have been found at any of these sites; neither have I recognized the distinctive flakes, found on most other sites, which are the product of re-working flint axe-heads.'

The group from Site 114 may therefore be considered, as far as the circumstances allow, a closed find.

Beaker 1 (Fig. 1, 1). Sherds from the upper part of a rather coarse beaker, external rim diameter about 6 inches, decorated with horizontal lines made by a stamp which, as will be discussed below, probably consisted of a flint blade with a cord or sinew wrapped round it. The ware is dark brown throughout, gritted with small potsherds and sand. Eleven more wall sherds, one bearing a row of chevrons, represent at least three similar beakers.

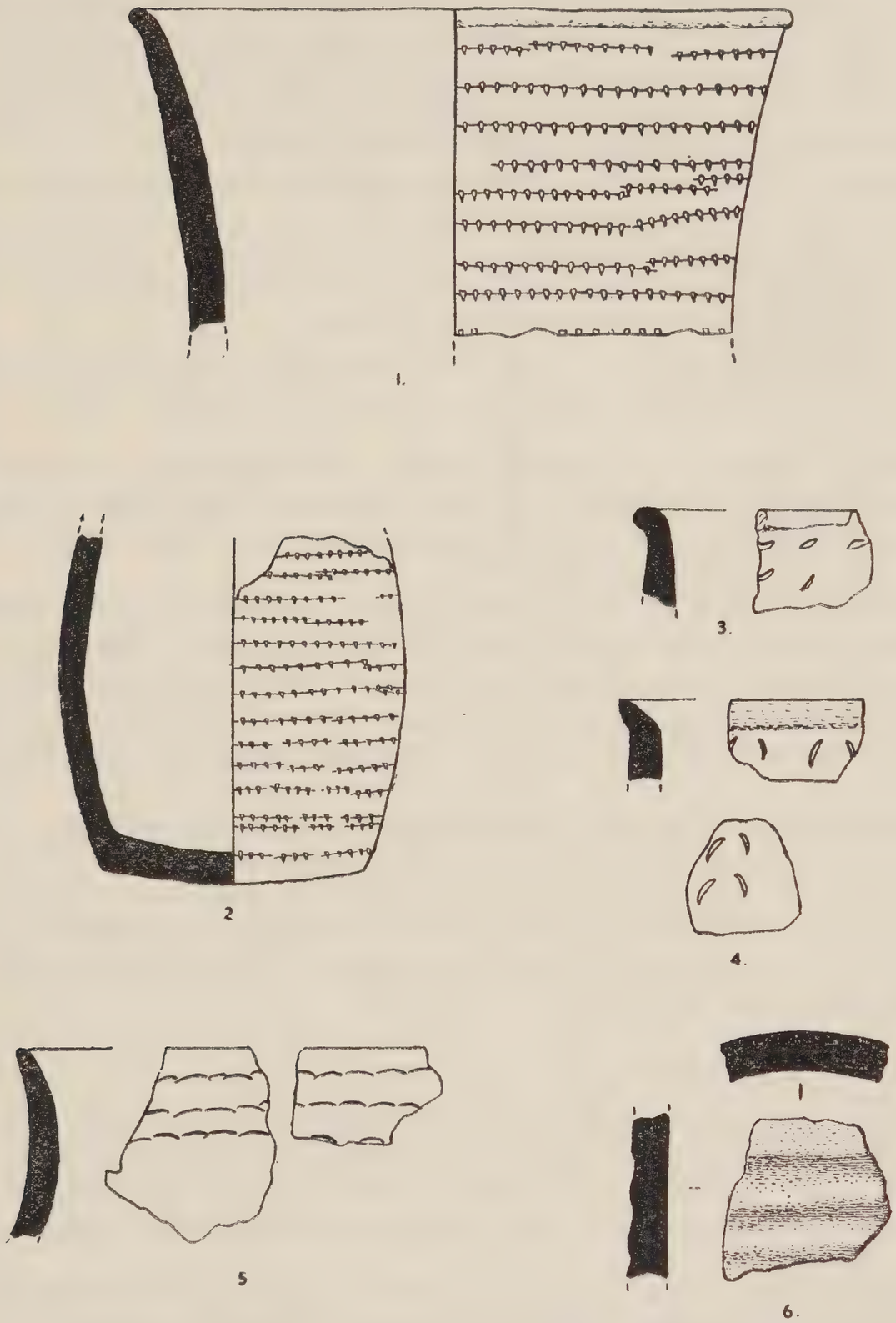


Fig. 1. Pottery from Site 114, Lion Point, Clacton (1/2).

Beaker 2 (Fig. 1, 2 and Pl. II, top left). Sherds from the base and lower part of a smaller beaker, decorated in the same manner, though by an appropriately finer stamp. The base is markedly convex. The ware is thin and fine, with well-smoothed surfaces. The exterior is reddish, the core black and the interior brown. It is tempered with sand, minute particles of burnt flint and potsherds. Two more sherds represent a similar beaker.

Beaker 3 (Fig. 2, 1). Sherds from the upper part of a very coarse beaker, external rim diameter about 7 inches, decorated with irregular vertical rows of paired fingernail impressions. The inner and outer surfaces are dark brown and uneven and form only a thin skin over the black core. Burnt flint, quartz and potsherd fragments are abundant.

Beakers 4 and 5 (Fig. 1, 3, 4). Rim and wall sherds from two smaller, finer beakers of the same type as No. 3, tempered with burnt flint and potsherds.

Beaker 6 (Fig. 1, 5). Two rim and five wall sherds (not illustrated) of a well-made beaker, ornamented with lines of fingernail impressions arranged in horizontal zones. Reddish exterior, greyish interior, no distinct core; gritted with sand and a little burnt flint.

Beaker 7 (Fig. 1, 6). Worn sherd, sparsely gritted with minute potsherds and sand, exterior red, interior grey, no well-defined core. Curvature in the horizontal plane, combined with straightness in the vertical plane, and ridged decoration made by pushing up the damp clay with the fingernails suggest that this may come from the cylindrical neck of a *halspotbeker* of the Bronneger type.[2]

Beaker 8 (Pl. II, bottom). Sherds from the upper part of a large beaker, external rim diameter 8-9 inches, decorated with horizontal lines of thumbnail impressions. Though thick, the ware is relatively good and well-fired, red inside and out, with brown patches, and freely tempered with small fragments of (mostly) burnt flint and a few minute potsherds. The perforation below the rim has been made after firing.

Handled A Beaker (Fig. 2, 2).

These sherds were found beyond Lion Point, at a level just below high tide mark where the strata are thin and confused. It is therefore uncertain whether or not they antedate the submergence, but, if the late date which will be argued for the pottery from Site 114 proves acceptable, there seems to be no reason why they should not do so.

The sherds are badly weathered and few in number, but enough survives to justify the reconstruction. The contours show that they cannot have belonged to a handled beaker of the cylindrical type. Only traces of the decoration,

2 The shape is well illustrated in Warren *et al.*, *P.P.S.* ii (1936), Fig. 8.

which has been made with a notched implement, remain on the rim sherd. Lozenge patterns are, of course, entirely typical on handled beakers, and the concentric lozenges are paralleled on a beaker from Peterborough[3] and on the bowl accompanying a handled beaker from a barrow on Ridgeway Hill, Dorset.[4] The ware is rather coarse, tempered with burnt flint and minute potsherds. The outer surface is reddish-brown (black at the rim), the core is black, and the inner surface brown.

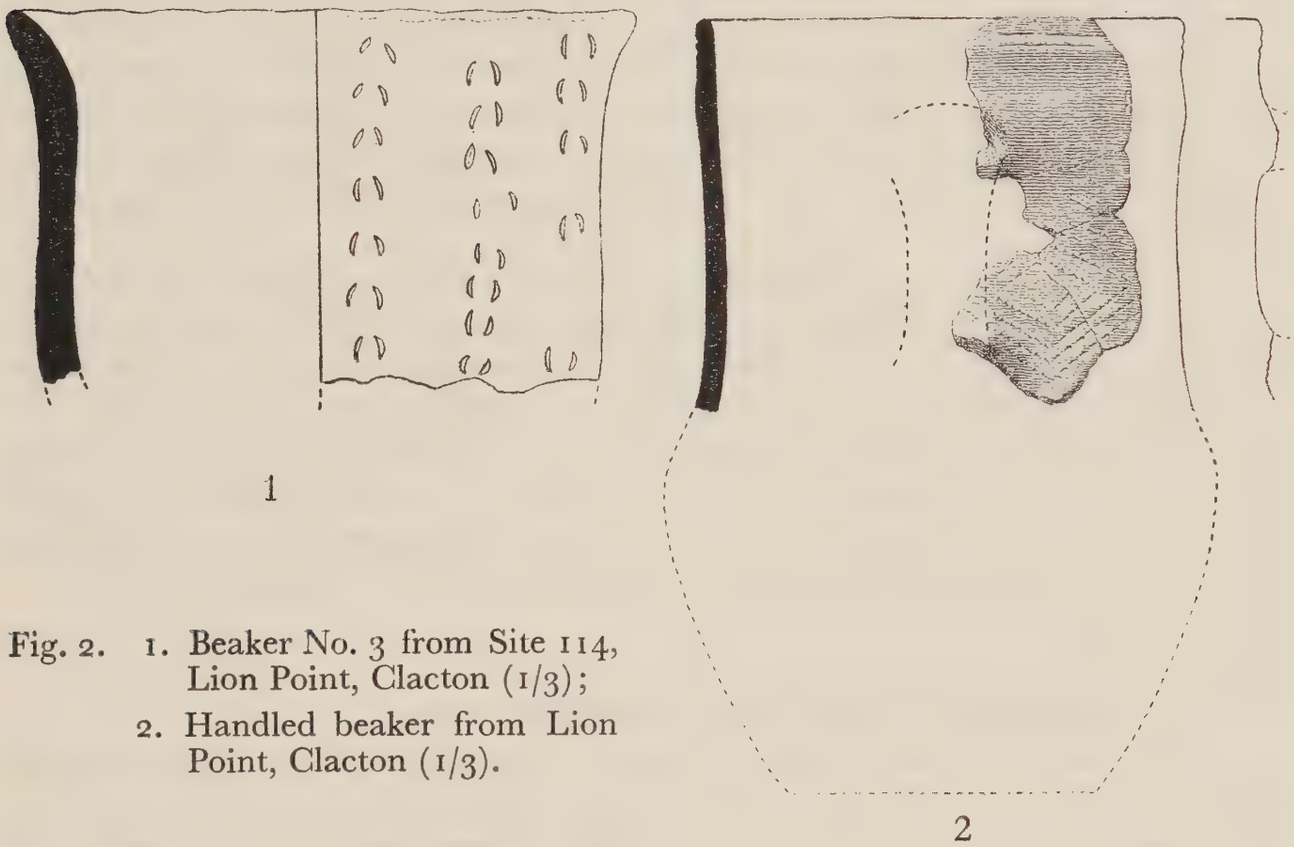


Fig. 2. 1. Beaker No. 3 from Site 114, Lion Point, Clacton (1/3);
2. Handled beaker from Lion Point, Clacton (1/3).

The use of comminuted potsherds as tempering material in many of these beakers is worthy of note. This device seems rarely, if ever, to have been recorded in Britain and an investigation of the chronological and cultural contexts in which it appears might bring interesting results. Potsherd grit appears to be relatively common in Dutch beakers and Bronze Age wares.

Traces of ring-building are visible on most of the sherds from Site 114.

The Decoration on Beakers 1 and 2 from Site 114.

Numerous irregularities show the lines to have been made by series of stamp impressions. Experiment and detailed examination of a large number of

3 Wyman Abbott, G., *Arch.*, lxii (1910), 10, Fig. 5, 2.
4 Fox, C., *Arch. Camb.*, lxxx (1925), Fig. 8.

similarly decorated pots, on the Continent as well as in England, have persuaded the writer that, as suggested by Forssander[5] and Oldeberg,[6] the stamp consisted of a flint flake (or thin slip of wood or bone), round which a cord or sinew had been loosely wrapped. Pl. II, top right, shows a flake encircled by a coarse thread and impressions made therewith on plasticene. The characteristics of the stamp are here exaggerated, but on most pots it is possible to detect the sharp line of the core, not only between the transverse impressions but also projecting at one or both of the ends. The shape, size and spacing of the transverse impressions are subject, of course, to considerable variation. This device should be clearly distinguished from real whipped cord, of which it may be an imitation, as well as from notched stamps. Perhaps the German term *Stacheldrahtlinien*, barbed-wire lines, which is graphic and at the same time unlikely to be confused with any other kind of stamp, may justifiably be borrowed for English usage.[7]

Various methods of imitating true whipped cord are known on the late Passage Grave pottery of Germany and Holland, but, as far as the writer is aware, the particular method under discussion is less common on such pottery than on beakers and other vessels contemporary with or slightly younger than the late Passage Grave period.[8] On the Continent the use of barbed-wire stamps may be taken as marking the last stage in the devolution of Neolithic ceramic decoration. In Britain, on the other hand, such stamps seem to have made but a transitory appearance, in no way affecting the evolution of Early Bronze Age pottery.

The Relationships of the Pottery from Site 114.

It has not as yet been possible to make more than a summary investigation into the occurrence of beaker or other types of pottery decorated with barbed-wire lines in Britain and the technique may prove to have a wider distribution than indicated here.

Three examples are illustrated by Abercromby: from Lambourn Down, Berks., Chagford Common, Dartmoor, and Stoford, Barwick, Som.[9] These three beakers comprise one-half of Abercromby's list of the BC variety in the area south of the Thames, and in his opinion the two from Lambourn Down and Stoford were very late specimens.[10] The beaker from Chagford was found in a closed cist, surrounded by a ring of stones, under a barrow, but unaccom-

5 Forssander, J.-E., *Die schwedische Bootaxtkultur* (Lund, 1933), 20.
6 Oldeberg, A., *Hällkistan från Ingemarstorp* (Stockholm, 1954), 35.
7 Although Langenheim, *Die Tonware der Riesensteingräber in Schleswig-Holstein* (Neumunster, 1935), includes other techniques under this name.
8 A comprehensive study of this pottery, which occurs in Germany mainly in the west of Schleswig-Holstein, is shortly to be published by Dr K. W. Struve of Schleswig.
9 *B.A.P.*, i, Pl. VII, 41, 40, 42 bis.
10 *Ibid.*, i, 23.

panied by other grave goods.[11]

The type seems to occur most frequently in the extreme south and east. Here it has thrice been found in graves. Ditchling Road, Brighton, Sussex:[12] a beaker with a cordon below the rim and zone of criss-cross impressions between zones of horizontal lines, in what appears to have been a flat grave, oriented NE-SW,[13] containing also a crouched skeleton with a heap of shells before the mouth and a barbed-and-tanged arrowhead. Church Hill flint mines, Findon, Sussex:[14] a large beaker, with a cordon below the rim and zones of horizontal lines, accompanied by two flint axes, was sealed under a flaking floor in the upper filling of Shaft 1 and is said[15] to have been inverted over a deposit of cremated bones. Sherds of a rusticated pot were scattered in the same level. (Although the impressions on these two beakers from Sussex differ somewhat from any others the writer has seen, they seem more likely to have been produced by a barbed-wire stamp than by any other recognized technique.) Felixstowe, Suffolk:[16] two barbed-wire beaker sherds, a small beaker with fingernail impressions, other sherds (some from the bases of large vessels), a heap of shells, and cremated bones, all said to have been closely associated.

Five more barbed-wire beakers from East Anglia seem to have been found without associations: two from the neighbourhood of Ipswich,[17] one each from Fingringhoe and Little Holland, Essex,[18] and one from the Badwell Ash Gravel Pit, Bury St Edmunds.[18a] Four of these are of B2 form.

A small B2 beaker with typical barbed-wire decoration was found near the centre of a low barrow at Cley-next-the-Sea, Norfolk.[18b] It lay on a 'platform of fire-scorched pebbles' and nearby was a large patch of dark earth and charcoal, but no cremated bones or traces of an inhumation were seen. The beaker contained only sand.

Quite apart from the wider dating evidence for barbed-wire decoration, discussed below, it is clear from the burial associations, the devolved form (often B2), and the presence of neck cordons, that this is a late beaker group. Here it may be noted that Mr Hazzledine Warren's Site 102 (located well within the submerged area) yielded a beaker with a neck cordon and fingernail

11 *V.C.H. Devon*, i, 360 and Fig. 14; this illustration shows diagonal impressions across the rim as well, a feature which recurs on related vessels on the Continent.

12 Curwen, E. C., *The Archaeology of Sussex* (2nd ed., 1954), 150 and Pl. XI, 1.

13 *Ant. J.*, ii (1922), 55-6.

14 Curwen, *loc. cit.*, 115, Figs. 25-6.

15 *Ibid.*, 149. In a communication to Curwen, Grimes has suggested that this vessel was a late arrival from Holland.

16 Ipswich Museum, No. 1921-60.

17 Clark, J. G. D., *P.P.S.E.A.*, vi (1933), Pl. XXXI, 14, 15.

18 Both in the Castle Museum, Colchester. The Little Holland beaker is the larger of the two illustrated on Pl. IIIA, *What to See in the Castle Museum*, published by the Museum Committee . . . of the Borough of Colchester.

18a. Peterborough Museum.

18b. Williams, J. F., *Norfolk Archæology*, xxii (1924), 206-8.

impressions (as yet unpublished), and this, with the beakers from Site 114 and the previously published pot-beakers, may be taken as the latest datable objects deposited before the submergence.

It thus becomes apparent that no long interval of time can have separated the final settlement at Lion Point and the post-submergence Early Bronze Age settlements in the Fenland at Peacock's[19] and Plantation[20] Farms, and indeed from the latter comes a sherd with a single line of decoration strikingly similar to that made by a barbed-wire stamp.[21] Though not itself of beaker fabric, it was associated with A beakers, rusticated and cord-impressed wares and sherds with cordons below the rim. As a whole, the pottery from these sites does look later than the latest material from Lion Point, but the difference in date can hardly be great enough to permit the interpolation between the two groups of the whole of Godwin's Zone VIIc, the period of formation of the fen clay,[22] unless an improbably brief length of time can be allowed for the latter, perhaps less than one-fifth of Godwin's estimated 500 years.[23] Even Frere's estimate of 100 years, made in connection with the Grooved Ware from Hills Road, Cambridge,[24] which on analysis proved likely to have been made of fen clay, seems rather too long.

The two small open bowls from the Thames at Mortlake (or Kew) and at Putney[25] are related by their decoration to the barbed-wire beaker group. (In describing the ornament Curle suggested an elaborate method of application, but examination of the bowls in the British and London Museums[26] has satisfied the writer that in fact a stamp of the barbed-wire type was used.) To what culture these bowls should be assigned is not clear; it is possible that, as Piggott suggested,[27] they belong with Peterborough ware, but, if so, they are atypical.

Although both belong to such a simple type, it is perhaps not inappropriate to compare Beaker 3 from Site 114 with that excavated by Grimes from the secondary burial in the double ring-ditch at Linch Hill Corner, Stanton Harcourt, Oxon.[28] The resemblance in shape and decoration might not in itself be worth mentioning if it were not for some significant features of the burial. The body had been placed in a wooden coffin laid in a grave-pit oriented NW-SE, as is the case with late beaker burials in Holland. The bone ring-

19 Clark, J. G. D., *Ant. J.*, xv (1935), 284 ff.
20 *Idem*, xiii (1933), 266 ff.
21 *Ibid.*, Pl. XLV, 13.
22 Godwin, *loc. cit.*, III, Fig. 27.
23 *Ibid.*, II, 403.
24 Frere, D. H. S., *Ant. J.*, xxiii (1943), 34 ff.
25 Curle, A. O., *Ant. J.*, iv (1924), 149 ff., Pl. XXVIII and Fig. 1.
26 The bowl from Putney, formerly in the Royal Scottish Museum, Edinburgh, has been transferred to the London Museum.
27 *Arch. J.*, lxxxviii (1931), 114, 153, and Fig. 14, 6.
28 *Oxoniensia*, viii-ix (1943-44), 34-45, Figs. 14-18.

pendant found beside the skeleton has, as Childe pointed out in a communication to Grimes,[29] its closest analogies in similar objects found in Swedish Stone Cists. The more elaborate ring-pendant from Sittingbourne, Kent,[30] was associated with a skeleton, a flat bracer, and a tanged knife-dagger with a single rivet. A similar dagger in a grave-group from Driffield, E. R. Yorks,[31] accompanied an AB beaker with cordoned neck and a curved bracer with gold studs.

The sherd which, as suggested above, may come from the neck of a *halspotbeker*, points directly to the connection with the Netherlands discussed by Piggott in the earlier publication of pottery from Mr Hazzledine Warren's collections,[32] and which has, of course, been noticed by many British and Dutch archaeologists.[33] The association of this sherd with the others from Site 114 indicates that we may, in fact, be dealing with the ceramic products of a single cultural group. Beakers 3, 4 and 5 are probably just carelessly executed examples of the type previously published from Dovercourt.[34] This in turn is related to the large pot-beaker of Dutch type, similarly decorated and with a cordon below the rim, from Stone Point, Walton.[35]

Further support for this argument is found in the Netherlands, where barbed-wire decoration occurs in combination with paired fingernail marks,[36] with a neck cordon,[37] and with impressed circles.[38] Impressed circles occur again on a small sherd from Lion Point,[39] and somewhat larger ones on a rusticated *halspotbeker* from Kootwijk.[40]

The curiously shaped vessel excavated by van Giffen from a barrow at Gasteren[41] is the only barbed-wire beaker as yet found in certain and direct association with a burial in Holland. The size of the primary barrow (1.30 m. high, 13 m. diameter), and the SE-NW orientation of the grave are characteristic of the late beaker period. Van Giffen remarks on the relationship of this beaker to that from Ohlenburg (see below).

Heuvel 3, Garderen,[42] covered two contemporary burials in wooden

29 *Ibid.*, 43.
30 In the British Museum; described by Payne, *P.S.A.*, x, 29.
31 *Later Prehistoric Antiquities of the British Isles*, published by the Trustees of the British Museum, 1953, Fig. 15.
32 *P.P.S.*, ii, 188.
33 The connection has been discussed by van Giffen, *De Hunebedden in Nederland* (Utrecht, 1927), ii, 493, and elsewhere.
34 *P.P.S.*, ii, Fig. 3, 2.
35 *Ibid.*, Fig. 3, 1.
36 Glasbergen, W., *Palaeohistoria*, iii, Fig. 63, 6.
37 Bursch, F. C., *Die Becherkultur in den Nederlanden* (Marburg, 1933), Taf. V, 5.
38 From Site V, Wijchen, near Nijmegen; unpublished and referred to by kind permission of Dr W. Glasbergen.
39 *P.P.S.*, ii, Pl. XXXIX, 10.
40 Pleyte, W., *Nederlandsche Oudheden* (Leiden, 1877-1902), Gelderland section, Pl. XVIII, 5.
41 *Nieuwedrentsche Volksalmanak*, 1941, 29-31, Afb. 32.
42 Bursch, *loc. cit.*, 31-34, Abb. 31-32.

coffins. Associated with one were amber beads, a 17 cm. long dagger of Grand Pressigny flint, and a broken thick-butted axe of Northern type, and, presumably, origin. A similar axe came from the other grave. Both appear to be of the short, crudely fashioned kind found in Scandinavia in Stone Cist or Boat-axe contexts.[43] Lying between the graves was a sherd with barbed-wire ornament. *Potbeker* fragments and a hollow-based arrowhead occurred at a higher level.

A well-dated beaker comes from Tumulus II, Ermelose Heide.[44] The primary interment in this barrow was oriented E-W and accompanied by two beakers with herringbone decoration and a flint knife—a burial typical of the older Single-Grave culture in Holland. The barbed-wire beaker sherds were found on the surface of the primary mound near the edge and covered by the material of the first enlargement, which was probably made to accommodate a late beaker grave.

With the exception of certain ambiguous instances (Meervelderweg,[45] Wessinghuizen,[46] and Twente[47]), barbed-wire beakers and *potbekers* fall within the bell-beaker period in Holland. The *potbekers* excavated by van Giffen from the *hunebedden* of Bronneger[48] and Havelte[49] are assigned by him, on stratigraphical as well as typological grounds, to the later or latest deposits therein[50] and to the Late Neolithic or Aenolithic period. In Tumulus III, Vries,[51] van Giffen found a *potbeker* sherd in the material of a mound of which the size and the orientation of the (empty) primary grave indicate a late date; he attributes the sherd to the first period of the barrow.

Finally, a possibly significant find, made between Hillegom and Lisse, should be recalled.[52] A poor specimen of a Scandinavian flint dagger[53] was discovered in dune sands. Further investigation brought to light three sherds of pottery from (allegedly) the same spot, two of which are decorated with barbed-wire lines. Although there is no proof that all the objects belong together, it is by no means improbable that they do.

A site in Western Germany which bears curious, though possibly fortuitous, resemblances to Linch Hill Corner may be mentioned here. At Selm, Kr.

43 Forssander, J.-E., *Die ostskandinavische Norden während der ältesten Metallzeit Europas* (Lund, 1936), 135; and *Die schwedische Bootaxtkultur* (Lund, 1933), Fig. 53.
44 Modderman, P. J. R., *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek in Nederland*, (1954), 22-24; Fig. 6.
45 Bursch, *loc. cit.*, 38; Taf. IV, 9 (handled beaker).
46 van Giffen, A. E., *Die Bauart der Einzelgräber*, i, 64-7; ii, Abb. 53.
47 Hijszeler, C. C. W. J., *Verslagen en Mededeelingen . . . van Overijsselsch. Regt en Geschiednis*, 2nd series, xxxvi, 14-29.
48 *Hunebedden*, iii, Pl. 154, 87, 89 (*halspotbekers*); 76 (*potbeker* with two cordons below the rim).
49 *Ibid*, ii, 154.
50 *Ibid.*, 493.
51 *N.D.V.*, 1941, 15-19, Afb. 15.
52 Oppenheim, R., *Oudheidkundig Mededeelingen*, x (1), 8.
53 Wrongly compared by Bursch, *loc. cit.*, 41, to a plano-convex knife from Yorkshire.

Lüdinghausen,[54] a double ring-ditch had been cut by secondary graves, in one of which was a small beaker with paired fingernail decoration. Both the ring-ditches yielded sherds of barbed-wire beakers.

The discovery at Ohlenburg,[55] on the outskirts of Hamburg, of a devolved Single-Grave beaker, decorated with barbed-wire lines and containing a number of bronze objects, gives the closest dating we may at present expect for this kind of decoration. The bronzes, all of Unětice origin, belong to Bronze Age I. The pot and its contents are now in the Eastern Zone, but the published illustrations indicate their character sufficiently well. The metal objects comprise part of an axe with slight flanges, eight simple *Noppenringe*,[56] and a ring of bronze ribbon. The decoration on the 12 cm. high pot has been carelessly applied, but consists of a zone of approximately horizontal lines, finished off below with a band of zigzags.

The pot (which, it will be remembered, van Giffen compared with the vessel from Gasteren) is in turn likened by Schwantes[57] to pots from the Swedish Stone Cists on account of the similarity of the ornament, and correlated with the first half of the Stone Cist (Late Neolithic) period, in effect the beginning of the Bronze Age.

Not only does this important find give a relatively reliable date in North-western Europe for beakers with barbed-wire ornament, but it also gives a *terminus post quem* for a marine transgression the evidence for which has recently been published by Schindler.[58] The Ohlenburg pot was found only a few metres away from one of the habitation sites at Boberg (Site 12) which yielded sherds of belated Single-Grave beakers, barbed-wire beakers, bell-beakers, and nothing later. Site 15 produced a great deal of earlier material, but again barbed-wire sherds and a hollow-based arrowhead may be taken as the latest objects deposited. The intensive habitation of the Boberg area ceased at the onset of the transgression, which gradually flooded the banks of the Elbe and its tributary, the Bille, and settlement was not resumed until the Middle Ages. The relics of prehistoric habitation were sealed below a thin formation of clayey peat, over which a 20-60 cm. thick deposit of marine clay had been laid down. The similarity of these geological phenomena to

54 Albrecht, C., *Westfalen*, 19, Heft 2 (1934), 136. Barbed-wire and rusticated beakers occur frequently on habitation sites in Westphalia which were subsequently occupied by palisade barrows and even Late Bronze Age ring-ditch cemeteries (Cf. *Germania* 24 (1940), 85 ff. and 179 ff.)

55 Schwantes, G., *Die Vorgeschichte Schleswig-Holsteins* (Neumunster, 1939), 292, Abb. 351-2; *Kieler Festschrift* (1936), 79-92, Figs. 10, 11. In both publications Schwantes refers to the site as Ohlendorf; it is now known as Ohlenburg. Schindler (see below) lists it as *Fundplatz* 11, Boberg.

56 The term *Noppenring* seems universally to be applied to the larger, simpler type found at Ohlenburg and to the small, elaborately wound type, often made of gold wire and probably worn as ear-rings, which is perhaps of slightly later date.

57 *Kieler Festschrift*, 85.

58 *Hammaburg*, ix (1953), 1-17.

those observed on the Essex coast[59] is noteworthy and in this case the archaeological evidence, unless it has been misinterpreted, does suggest a remarkably precise correlation.

According to Schindler,[60] the late pottery from Boberg is to be linked with that from the habitation site at Neu-Boberg and the urn-cemetery at Sande published by Schwantes.[61] The material from Neu-Boberg seems to represent occupation by a Late Neolithic group; among the flint objects illustrated by Schwantes are seven hollow-based arrowheads and the remnant of a repeatedly trimmed flint dagger. The devolved Single-Grave beakers at Sande contained cremated bones and had been set into the ground without covering mounds; staining of the bones by vanished copper or bronze objects was visible in several instances. A rolled-up ribbon of bronze with rows of small bosses was found in the cemetery (though not in an urn) and was accepted by Schwantes as contemporary with it.

In Denmark pottery with barbed-wire decoration appears to be absolutely rare. In Norway and Sweden the technique occurs on Boat-axe vessels of Style III and, in Forssander's view,[62] is derived from Stone Cist pottery, bearing witness to 'the intimate chronological contact' between the two. We may therefore take it that this ornament appears in Sweden at the beginning of Late Neolithic, chiefly on the Horgen-like pots of the Stone Cists.

Of the material, abundantly illustrated by Forssander[63] and Oldeberg,[64] it will suffice to mention that from the classical cist of Skogsbo,[65] where the finds were stratified. In the lowest deposit were: a typical splay-footed pot bearing coarse barbed-wire impressions, Type II daggers, a hollow-based arrowhead; in the second deposit: atypical Type II daggers, two bronze ornaments, a sandstone ring-pendant;[66] in the third: one plain pot, another with a few random barbed-wire impressions, Type III daggers and hollow-based arrowheads. The degenerate character of the ornament on one pot and its absence on the other may indicate that this ornamental technique was beginning to disappear in Sweden by the Type III dagger stage.[67]

A few large vessels with cordons below the rim which in form sometimes recall the Dutch *potbekers* appear to belong to the Late Neolithic in Denmark as well as in Sweden. In Seeland such pots have twice occurred in stone cists,

59 Cf. *P.P.S.*, ii, 179; the sequence is fully set forth by Zeuner, *Dating the Past* (1950), 97-99 and Fig. 35.
60 *Loc. cit.*, 16-17.
61 *Kieler Festschrift*, 79 ff.
62 *Bootaxtkultur*, 47-50.
63 *Ostskandinavische Norden, passim.*
64 *Loc. cit., passim.*
65 *Ostskandinavische Norden*, 121-2, Taf. XXIII-IV.
66 This is the specimen referred to by Childe, *Oxon.*, viii-ix, 43.
67 Some of the grave groups listed by Forssander, *loc. cit.*, 152-53, may provide evidence to the contrary.

once with Type II and once with Type III daggers and bronze objects.[68] One of the pots from Nosaby, Skåne, has also four lines of barbed-wire impressions below the cordon.[69] Even more like *potbekers* are large rim fragments from Västerbjers[70] and Stora Förvar.[71] Barbed-wire impressions are here found in several instances on large pots with everted rims and neck cordons. At both sites this pottery is considered to represent the latest occupation and the transition from Middle to Late Neolithic. It is perhaps worth noting that Piggott[72] has cited the Västerbjers cemetery (with burials of the Middle Neolithic pit-comb ware culture) as a good parallel to Upton Lovell 4 and other British graves with perforated bone points and animal tooth ornaments.

Barbed-wire decoration is found also on pottery from the East Baltic area: in Finland it has been assigned by Äyräpää to the final or Kiukais phase of the 'dwelling-places';[73] a few sherds, one with diagonal impressions across the rim, are illustrated in a report of recent excavations on the shore of Lake Tamila in Estonia.[74]

Summary

In view of the existing evidence it is suggested that the Lyonesse-Boberg transgression affords a *terminus ante quem* for: the appearance in Britain of barbed-wire and cordoned beakers, pot-beakers, probably A beakers, and bone ring-pendants; barbed-wire beakers and *potbekers*, i.e., Bell-beaker-Aeneolithic, in Holland; barbed-wire beakers and the beginning of Montelius I[75] in North-western Germany; barbed-wire ornament, cordoned pots, ring-pendants, Type III daggers, in Sweden.

That the beginning of the Wessex Culture must come close to this horizon seems clear, and one further piece of evidence may be brought forward. A chip from the cutting edge of a greenstone axe, found by Mr Hazzledine Warren on the Lyonesse surface in a 'cooking-hole' in Area 4 (the Grooved-ware area), has recently been examined by the Stone Axe Sub-Committee of the South-Western Group of Museums and Art Galleries. The specimen, No. 892 in the Sub-Committee's list, has been determined as Group I, a group notable for its

68 Magnusson, M., *Medd. från Lunds Universitets Historiska Museum*, 1948-9, 155 ff.—Kallerupgaarde 3a and Bjere.

69 *Ibid.*, Abb. 2, c.

70 Stenberger, M., *Das Grabfeld von Västerbjers auf Gotland* (Lund, 1943), Taf. 42, 1, 2, 3.

71 Schnittger, B. and Rydh, H., *Grottan Stora Förvar på Stora Karlsö* (Stockholm, 1940), Pl. LXII and others.

72 *Neolithic Cultures*, 360-1.

73 Äyräpää, A., *Acta Arch.*, i (1930), 270 and Abb. 93.

74 Yanits, L. I., *Sovietskaya Arkheologya*, xix (1954), 150 ff. and Fig. 15.

75 Or Reinecke A1. It seems unnecessary to bring all *Noppenringe* and embossed bronze bands down to Reinecke A2/B1 and to the Type IV dagger stage as suggested by Forssander *Ostskandinavische Norden*, 102, 103, 208), Schwantes (*Kieler Festschrift*, 83) and Sprockhoff (*B.R.G.K.*, 31, ii, 76, note 134); or, alternatively, to raise them all to 1A (Kersten, *Zur älteren nordischen Bronzezeit*, 45, 99).

Late Neolithic/Early Bronze Age associations.[76] Of particular interest is specimen No. 303, a squared muller which accompanied the male skeleton in Upton Lovell 4. The grave goods with this burial were mainly Late Neolithic in character, but included typical Wessex battle-axes; with the female skeleton, which cannot have been buried very many years later, was a bronze awl of Thomas's earliest Wessex type.[77]

In this connection it is of interest to note that three of the sherds from Plantation Farm[78] seem to reflect at least the Grooved-ware tradition; the probability that fen clay was used in the manufacture of the undoubted Grooved-ware from Hills Road lends substance to this observation. Thus, for more than one reason, it looks as though the Lyonesse surface became uninhabitable not very long before settlement in the Fenland became possible once again.

Acknowledgements

A large proportion of the Continental pottery referred to in this paper was examined during a research journey made possible by a grant from the Research Fund of the University of London, for which the writer is deeply grateful. The writer is also especially indebted to Professor V. Gordon Childe for many kinds of help and encouragement and acknowledges with thanks much assistance from the following: J. J. Butler (London); Dr W. Glasbergen (Groningen); Miss A. Henshall (Edinburgh); Erik Hinsch (Bergen); Fil. lic. Lili Kaelas (Stockholm); Dr P. J. R. Modderman (Amersfoort); Dr M. Petersson (Lund); Dr R. Schindler (Hamburg); Dr K. W. Struve (Schleswig).

76 Cf. *P.P.S.*, xvii (1951), Pt. 2, 104, where specimens examined up to 1951 are listed. Dr J. F. S. Stone has kindly supplied a list of the specimens examined since that date which were found in definite contexts. In seven out of eight instances they had been discovered in or under barrows, or in henge monuments.

77 Thomas, N. de l'E. W., *Three Wessex-Culture Barrows and their Material*, lecture delivered to the Prehistoric Society at Salisbury, 11 September 1953.

78 Clark, *Ant. J.*, xiii (1933), Pl. XLV, 15; Pl. XLVI, 24, 25.

Radiocarbon Dates

By F. E. Zeuner

Radiocarbon dates often agree admirably with other estimates of the samples' ages and this is one of the reasons why the method of C14 dating has become popular. On the other hand, many specimens carefully dated on extraneous evidence, archaeological or otherwise, have given C14 dates that deviate conspicuously from the expected date. On the whole, this rather less popular aspect of the method has not received the attention that it deserves (Childe, 1950; Zeuner, 1950, 1951, 1952). Research on the possible causes of such 'erroneous' results comprises two very different aspects. One is that the apparatus and method used may be at fault, and this matter is being looked after by the physicists and chemists concerned. The other is the history of the samples from the moment it became an 'archaeological specimen' to the moment it enters the combustion chamber in the laboratory. Of this long period, the latter part, the history of the sample since its discovery, i.e. its treatment by the excavator, its exposure to contamination during transport and in a museum, has been receiving attention. There remains to be studied the far longer history of the specimen while it was part of a deposit in the geological sense. Some problems of this kind are at present being investigated by the Geochronological Laboratory in conjunction with the Davy-Faraday Laboratory of the Royal Institution. This work, now sponsored by the Department for Scientific and Industrial Research, was initiated over three years ago, when Dr A. R. Crathorn began to develop the apparatus. In doing so, he benefited from the active help and advice of Dr Loosemore of the Atomic Energy Research Department, Harwell, and of Dr H. Barker of the British Museum Laboratory, who has been specializing in the development of the somewhat complicated apparatus required for the production of acetylene (Barker, 1953). Unfortunately, Dr Crathorn has had to leave the team, but Mrs Vera Smith, formerly of the Physics Department of Bedford College, has taken his place.

The apparatus is housed in the basement of the Davy-Faraday Laboratory. Instead of solid carbon as used by Dr Libby, acetylene is produced and its activity measured in a gas counter, as described by Crathorn (1953-1954). It appears that this method produces slightly more satisfactory results, especially for the last few thousand years. My thanks are due to the former director of the Royal Institution, Professor E. N. da C. Andrade, to its present Director, Sir Lawrence Bragg, and to Mr R. King of the Davy-Faraday Laboratory,

for their constant and efficient collaboration, and to Dr W. Lüdi, Director of the Geobotanisches Institut Rübel, Zurich, Dr K. Kenyon, London University Institute of Archaeology, Mr R. Summers, Curator at the National Museum, Bulawayo, Professor H. de Vries, Natuurkundig Laboratorium, University of Groningen and the Director of the Geological Survey and Museum, London, for specimens and relevant information.

Among the problems which it is hoped to elucidate are the following:

(1) To what extent is the radiocarbon date influenced by physical contamination? Such contamination may consist of roots, other plants remains that have entered the specimen, fungi, insect faeces, etc.

(2) To what extent is the apparent radiocarbon date influenced by organic matter absorbed into the specimen while in the ground? Such matter may consist of younger humus derived from later soils, or of older humus derived from, for instance, bituminous sources.

(3) Can the date of samples of type (2) be improved by chemical pretreatment or by charring them?

(4) Do all types of Recent organic matter show the same specific activity? That carbonates may differ from organic compounds has been established by Nier's work (discussion in Zeuner, 1951, p. 232). Animal matter may differ slightly from vegetable matter. The question is whether, in the formation of a chemical compound, C14 is taken in selectively, compared with C12.

(5) Does chemical disintegration of the specimen, which may take place under the influence of soil-forming processes for instance, change the ratio of C14 : C12 in favour of one or the other? In other words, does decaying wood, or wood which is slowly carbonised by ageing, retain that ratio, apart from the normal loss of C14 in conformity with its half-life?

(6) Is it possible to concentrate finely distributed organic particles in archaeological horizons or in soils and to use them for reliable C14 counts? Such concentration may be effected chemically or mechanically, for instance by using a flotation method as applied in ore concentration.

It is clearly necessary that the samples should be carefully selected and collected for the purpose of solving a particular problem. Sources of error other than those to be investigated must be excluded. For preference, samples are collected by the investigator, and the geological, pedological and archaeological context studied. They are subsequently studied, cleaned and pretreated in the laboratory, before being handed over to the physicist for combustion.

The dates so far obtained are few, since much time was spent on the development of the apparatus. They do not yet solve any one of the questions here outlined. Nevertheless, they appear to be of sufficient archaeological interest to be published.

In the list which follows, the expected age is given, and its mode of computation is indicated as 'arch.' if based on archaeological dating, 'SC.' if a previous radiocarbon date of the *same specimen* was available based on a solid carbon count, or 'CO_2' if carbon dioxide was used. This symbol is followed by the index letter of the laboratory concerned, and its serial number.

In the case of archaeological dates, the limits given are usually the probable extremes of the estimate, and they are placed in front of the word *years*. This is not the standard deviation. Radiocarbon dates, on the other hand, are given with their standard deviation, which is placed after the word *years*. It will be remembered that the standard deviation (σ) has nothing to do with the geological or archaeological degree of certainty of the date concerned. It indicates solely the error involved in counting random events, in this case of radioactive disintegrations. One σ implies that one in every three determinations is liable to fall outside the limits given. For further information about the principles of the radiocarbon method, and its archaeological implications, Zeuner (1951 or 1952) may be consulted.

G.L. 23. Wooden beam from beneath St Walburg Church, Groningen, Holland.

Expected age (CO_2, Groningen Lab.), 940 years $\pm$ 60: *c.* 1010 A.D.
Acetylene age, 950 years $\pm$ 80: *c.* 1000 A.D.

The wood was kindly supplied by Professor H. de Vries, Groningen, who had dated another portion of the same specimen by the CO_2 method. The result of the acetylene count agrees closely with his and a valuable check has thus been obtained. It appears that gas counters enable one to attain considerable accuracy with very young material. An archaeological date for the specimen was not available.

GL. 19. Wood from Zimbabwe Ruin, Southern Rhodesia.

Expected age (arch.), for foundation, 1150 $\pm$ 100 years: 8th to 9th cent. A.D.
Expected age (SC. C.613), 1506 years $\pm$ 350: *c.* 444 A.D.
Acetylene age, 1240 years $\pm$ 80: *c.* 710 A.D.

The wood comes from a small log of a *Spirostachys* sp., incorporated in the stone wall of the famous ruin. One half of it was submitted to Dr Libby, who obtained the result given above. The other was sent to the writer and very carefully cleaned of rot and insect faeces before combustion. Taking into account the large standard deviation of the Chicago result, the acetylene age is so close to the solid carbon age that the beam may be regarded as reliably dated. It must be remembered, however, that wood incorporated in a building may be considerably older than the structure itself, and this particular beam

may belong to an early portion of it. The foundation date is suggested by Dr Caton-Thompson (1931) to be eighth or ninth century. A paper by Mr R. Summers on the radiocarbon dates of Zimbabwe will shortly be published in *Antiquity*.

GL. 7, 8, 10. Oak pile from Wallbrook site, Roman City of London.

Expected age (arch.), 1850 ± 50 years : *c.* 100 A.D.

Acetylene age:

GL. 8, fresh interior, 2020 years ± 110 : *c.* 70 B.C.

GL. 10, interior, charred, 2120 years ± 110 : *c.* 170 B.C.

GL. 7, decayed outer wood, 2230 years ± 110 : *c.* 280 B.C.

This oak pile with a squarish cross-section comes from an excavation by Mr Edwyn Birchenough. This, and other material recently secured from Mr W. F. Grimes's excavations, including wood from the Mithras Temple, is being used in an attempt to investigate the influence of contamination with absorbed younger organic matter supplied by the Wallbrook, and also of decay, probably bacterial and/or fungal.

The expected age is based on associated archaeological finds and refers to the period of manufacture and use of the pile. Since it was squared, some of the outer rings are likely to have been lost, possibly many. The remaining section contains 90-100 growth rings. The radiocarbon age of the interior portion may, therefore, be 100 or more years higher than the expected age, and that of the outer portion perhaps 50 years. Indeed, all three radiocarbon dates obtained are higher than the expected age.

Considering first GL. 8 and 10, the two samples from the centre of the pile, one was tested in its natural state, whilst the other was converted into charcoal. The removal of volatile organic substances may be expected to increase the radiocarbon age, for younger organic substances derived from the water passing through the ground would thus more or less be driven out of the sample. The results agree with expectation, but the difference between GL. 8 and GL. 10 is within one σ, and therefore may well be due to chance. More material will have to be examined to settle this point.

Comparing GL. 8, untreated wood from the centre, and GL. 7, untreated but evidently decayed wood from the outer portion, the difference due to ring-age should be about 50 years, GL. 7 of course being the younger. In addition, if the decay was caused by fungi or bacteria which attacked the pile after it had been placed in position, younger organic matter would have been added. Thirdly, later humus solutions would have entered the outer part of the pile more readily than the compact inner portion. These three arguments would cause one to expect a noticeably younger radiocarbon date for the outer portion. The result, however, assigns a higher apparent age to the outer portion.

Again the difference is small, 200 years, but it raises the question whether fungal or bacterial decay can favour the selective removal of C14 from cellulose and lignin. Fresh material, both from this site and from Jericho will, it is hoped, help to provide an answer to this important question.

GL. 12. Oak board from late Hallstatt A, or early Hallstatt B lake dwelling (Late Bronze Age, Gersbach System) of Zug-Sumpf, Switzerland.

Expected age (arch.), 2950 ± 150 years : *c.* 1000 B.C.
Acetylene age, 3170 years ± 110 : *c.* 1220 B.C.

A board found in the horizontal position by the excavator, Dr J. Speck, and supplied by Dr W. Lüdi, Zurich. The site was described by Dr Speck (1953), the specimen coming from the lower of the two occupation horizons of the Urnfield culture. Pollen-analytically they belong to the *Fagus-Abies*-period, the divisions of which Dr Lüdi is at present investigating.

The specimen was not cleaned and not prepared in any way. Contamination by sedges and other younger matter was not removed. Other samples, cleaned and prepared in various ways, will be studied in due course.

The expected age is based on the correlation of the Late Bronze Age sequence of temperate Europe with the Mediterranean chronology by means of finds of imported specimens, as elaborated by Childe (1948) and Hawkes (1948). It should be noted that what Gersbach calls *Hallstatt A* is the Bronze Age E of Childe and Hawkes. In the article quoted the *beginning* of the Bronze Age E is given as 1050 B.C., and the expected age listed above implies the assumption that the find is Hallstatt A. Professor Childe informs me that, on archaeological grounds, he now considers the beginning of this phase should be put either a century earlier or a century later than 1050 B.C. This explains the margin of ± 150 years which has been allowed for the expected age. Should the specimen prove to be early Hallstatt B, however, a possibility envisaged by Dr Lüdi, its expected date would be about 800 B.C., and the discrepancy between it and the radiocarbon age would become serious. The radiocarbon age, therefore, pleads in favour of Hallstatt A, and in addition in favour of the earlier chronological alternative for this archaeological period.

GL. 17. Oak wood pile, GL. 18. Ash wood pile, both from late Neolithic lake dwelling of Egolzwil 3, Wauwiler See, Switzerland.

Expected age (arch.), 3850 ± 100 years : *c.* 1900 B.C.
Acetylene age:

GL. 17, oak, 4000 years ± 110 : *c.* 2050 B.C.
GL. 18, ash, 4650 years ± 110: *c.* 2700 B.C.

These two specimens were collected by Dr W. Lüdi of the Geobotanisches

Forschungsinstitut Rübel in Zürich, during the excavation of the site by Dr E. Vogt in 1952. From the stratigraphical and archaeological points of view, they are regarded as contemporary.

The expected age is based on pollen-analytical correlation, the absolute age being ultimately dependent on the Swedish varve scale. The oak pile gave a radiocarbon result which agrees closely.

The higher radiocarbon age of the ash pile, which differs by nearly six times the standard deviation, raises an intriguing question. It is highly improbable that it came from a tree which, at the time when the piles were made, was 650 years older than the oak from which the other pile was made. The difference is too great to be attributed to any difference in the specific activity of ash and oak, if any exists at all.

There thus arises the possibility that the Neolithic site of Egolzwil 3 comprises structures that are some 500 years older than has generally been believed to be the case.

GL. 5, GL. 6. Wood from grave furniture, Middle Bronze Age rock-tomb No. B. 35, Jericho, Jordan.

Expected age (arch.), 3600 ± 50 years : *c.* 1650 B.C.
Acetylene age, GL. 5, 3270 years ± 110 : *c.* 1320 B.C.
Acetylene age, GL. 6, 4100 years ± 150 : *c.* 2150 B.C.
Mean radiocarbon age, 3685 years ± 100 : *c.* 1735 B.C.

This tomb contained several succesive phases of burial, though all belonging to a period of about 100 years. It was reported on by Dr Kenyon (1952) and caused a minor sensation, not only because of the wooden table, other wooden objects (figured in the report quoted), matting, basketry and flesh, but the preservation of the brain in one of the human skulls. The problems involved in this mode of preservation will be discussed in another paper.

The expected age, which Miss Kenyon has supplied, is to be regarded as reliable. It is based on archaeological correlation with Egypt.

The mean radiocarbon age of the two samples shows that, had the material been pooled from the beginning, one would have been highly satisfied with the result. As the samples were studied separately, however, GL. 6 proved to be some 400 years older than the expected age. As this is more than twice the standard deviation, this difference has to be taken seriously. It may be explained by the assumption that the wood was about 400 years old when it was placed in the tomb, or else by infiltration of older bituminous matter which, as the writer's investigations in the 1954 season have shown, is available.

A third possibility is that fungal or other decay causes a selective loss of C14, a question which is receiving attention (see under GL. 7).

The radiocarbon date of GL. 5, however, being about 300 years younger than the expected age, cannot be explained in either way. Miss Kenyon is convinced that so late a date for the last burial of the series contained in the tomb is quite out of the question. It is possible to attribute it to contamination with younger organic matter, which may have entered in the form of fungi, insect remains and secretions, and so forth, but whether this effect could have been sufficient in quantity is very doubtful.

This problem will be investigated by means of fresh specimens. In the meantime, the two specimens from this tomb show that unqualified acceptance of radiocarbon dates derived from single specimens, at the present a popular practice, cannot be recommended.

GL. 24. Charcoal from late Chalcolithic rock tomb No. A. 94, from Jericho, Jordan.

Expected age (arch.), 5150 ± 200 years : *c.* 3200 B.C.
Acetylene age, 5210 years ± 110 : *c.* 3260 B.C.

This specimen comes from one of the earliest tombs of the cemetery to the north of the tell of Jericho, excavated by Dr K. Kenyon in 1952. It contained mass burials, apparently cremated, and its expected age was computed on the evidence of archaeological correlation with contemporary Egyptian sites.

The agreement is excellent, perhaps because charcoal derived from the cremation was used and because in a tomb of this type contamination or exchange of humic substances is likely to have been less intense than in those exemplified by GL. 5 and GL. 6.

GL. 27. Peat from Alleröd phase, Hawk's Tor, Cornwall.

Expected age (SC., C.341), 9861 years ± 500 : *c.* 7911 B.C.
Acetylene age, 9720 years ± 140 : *c.* 7770 B.C.

Peat from this locality, studied by Dr H. Godwin of Cambridge, had previously been dated by the solid carbon method in Dr Libby's laboratory in Chicago. His result is given above.

The acetylene age produced a closely similar result, and the two are within each other's standard deviation.

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Fresh Sidelights on the Indus Valley and the Bronze Age Orient

By F. A. Khan

Dr Khan has allowed us to extract from his comprehensive thesis entitled '*An Archaeological Study of the Indus Valley Civilisations and their Relationship to the Early Culture of Iran*', and publish here, a few brief sections that supplement or correct the account given by Professor Piggott in our Third Annual Report.

Baluchistan and the Indus Valley

An essential preliminary to a discussion of the cultural affinities between the Indus Valley and Iran [the central theme of the author's study.—*Editor.*] is a survey of the intervening hilly region of Baluchistan. Here Sir Auriel Stein discovered remains of the Harappa culture proper in the latest deposits at Dabar Kot in North Baluchistan, and at Kulli and allied sites in the south. Despite parallels betokening close interconnection between the Baluchi and the Harappa cultures, the chronological relation between the two has not been established with precision. Harappa designs indeed occur on the pottery of many Baluchi sites, and attest that the relevant Baluchi pottery is contemporary with some phase of the Harappa culture. But it is hard to decide at what point in the Harappa sequence should be placed the comparative Baluchi finds. Harappa culture presumably was flourishing before the earliest levels so far reached in the Indus Valley, and it may be that one or more of the Baluchi cultures flourished before or at the same time as the Harappa culture.

Apart from the evidence of pottery showing a resemblance to the Harappa culture, mainly drawn from Kulli, Mehi, Dabar Kot, Periano-Ghundai and Suktagen-Dor, the following common features in Baluchistan and in the Indus valley are worth recalling: (a) terracotta mother goddess figurines and humped bulls and pottery bangles at Periano-Ghundai, Moghul-Ghundai, Kaudani, Sur-Jangal, Dabar Kot and Suktagen-Dor. (The goddess figurines from the North Baluchistan wear a hood, and those from the south are decked with profuse jewellery.); (b) a terracotta model cart found at Shahi-Tump[1] identical in design with those so common on Harappan sites;[2] (c) the incised stone vessel from Mehi[3] (comparable to compartmented incised toilet boxes

1 Stein, *M.A.S.I.*; 43, Pl. XIV. Sh.T. 11.12.
2 Childe, *P.P.S.*, 1951.
3 Stein, *M.A.S.I.*, 43, Pl. XXVIII. Mehi, 1.6.4; cf. p.58 below.

found at Harappa and Mohenjodaro);[4] and (d) the copper mirrors from Mehi.[5]

Points of Difference between Baluchi and Harappa Pottery

There are marked differences in the colours used and the slips employed which clearly differentiate the Baluchi ware from that of the Harappa culture.

In the first place, the Baluchi potter employed a red paint in addition to black. On the sites in southern Baluchistan, this red (the secondary colour) is used in horizontal bands; in the northern Baluchistan sites it is employed also in thin outlines or fill-in elements of the design.[6] Apparently more fundamental is a distinction based on the slips employed. On the northern Baluchistan pottery, as well as at Mehi and Suktagen-Dor, a reddish slip or wash resembling, though inferior to, that of Harappan ware, predominates as a background for decoration. Buff and cream slips are common on south-Baluchistan pottery. The Harappan pottery has pinkish body, red slip and black paint.

Division of Pottery into Red and Buff Groups

An attempt has been made to divide the early cultures of Baluchistan and the Indus valley into Red Ware and Buff Ware cultures. Professor Piggott, following McCown,[7] has grouped the Zhob and Harappa cultures, and Cemetery 'H' pottery under the former category, and cultures of Quetta, Amri, Kulli, Shahi-Tump, Jhukar and Jhangar under the latter group. He equates this division with that made by McCown in Iran and considers that the Iranian cultures were 'parental to those of Baluchistan and the Indus valley, in the sense that the Buff Ware province of Southern Baluchistan is the easternmost extension of the equivalent south Iranian group, whilst a Red Ware region in North Baluchistan may be equated with a northern Iranian province'.[8]

There is, however, no strict geographical or chronological separation between the red and the buff wares. The difference in background is not associated with any significant differences in design; on the contrary, identical ornamental devices occur on red and buff slips.[9] At Nal, which should belong to a 'buff ware culture', we find not only identical designs on red and buff ware,

4 Marshall, *M.D.* Pl. CXXXI. 37.
5 *M.A.S.I.*, 43, Pl. XXXII. Mehi, 11.2.1.a.
6 In R.G. III B. we get fill-in elements on pottery.
7 D. E. McCown in his work '*The Comparative Stratigraphy of Early Iran*, 1942', divided the early cultures of Persia on the grounds of pottery colour into a Red Ware culture and a Buff Ware culture. The former includes the cultures of Sialk II, Chashmah Ali, Hissar I and Anau I, all discovered in North and North-east of Iran; the latter occurs at Giyan V, Susa A, though some Red Ware occurs here as well, Tepe Musyan and Tall-i-Bakun in West and South-west Iran.
8 Piggott, *Ancient India*, I, p. 9.
9 The best example is the intersecting circle which occurs on the buff ware of Nal and red ware of the Harappa culture.

but even red and buff vessels of identical form.[10] Moreover the recent discovery of widely distributed red ware in the area of buff ware in central and southern Baluchistan, is a fact militating against McCown's hypothesis,[11] which would differentiate Iran and Baluchistan into distinct Red Ware and Buff Ware provinces. The evidence does not warrant a separation of Baluchistan into two ceramic provinces, and in fact red and black wares appear to have been intermingled throughout. It would seem to follow, therefore, that there is insufficient evidence to justify the assertion that North Baluchistan was more influenced by North Iran. But it cannot be denied that Iranian ceramic did influence that of Baluchistan.

At Sur-Jangal the pottery has pinkish body, deep terracotta slip and black designs. But there are also specimens of painted pottery with a slip of varying shades from buff to cream or greenish-grey.[12]

At Mehi, which, according to Piggott, represents one of the buff ware cultures, Stein discovered pottery with black decoration over a red or dark terracotta slip. There are also plain vessels with red slip.[13] Even at Kulli we see light terracotta pottery with black decoration side by side with the buff ware.[14] And finally, vessels coated with a pale buff or cream slip occur at Mohenjodaro.[15] The use of cream and pale slips need not then mean that the southern Baluchistan ware contains a south-western Iranian element lacking in the Harappa culture. Yet it may constitute an additional link with Iran and denote an archaistic survival of a tradition which may once have been common to Iran and the Harappa culture. Although it is demonstrable that buff and red wares are frequently intermingled, it may well be that there are periods at which in certain districts the one prevails numerically over the other, as we know was the case for example in Giyan III. This is one of the many problems which requires stratigraphic solution, and can only be satisfactorily resolved by excavation.

10 Hargreaves, *M.A.S.I.*, 35, Appendix IV,
p. 46 Type I (b) — 27. E. 27 red ware: 30. E. 31 buff ware.
p. 47 Type I (c) — 60. G3. 9 red ware: 61. G3. 10 buff ware.
p. 48 Type 2 — 85. B. 30 red ware: 86, C7, 3 buff ware.
p. 49 Type 3 — 117. G3. 21 red ware: 118, G3, 22 buff ware.
p. 49 Type 4 — Tumbler-like vessel. Two specimens, one red, the other buff.
p. 49 Type 5 — 132. All red ware: 133 Gp. A. 6. buff ware.

11 In 1948 Miss B. de Cardi discovered in Kalat State of Pakistan a number of prehistoric sites. At one of these sites, namely Togau, she identified a new ware. It is hard, well-made wheel-turned red ware decorated with black designs consisting of geometric patterns and stylized representations of goats and ibexes. This ware had a wide distribution throughout central and southern Baluchistan. (*Art and Letters*, XXIC (No. 2), 1950.)

12 *M.A.S.I.*, 43, p. 74.

13 *ibid*, p. 159.

14 *ibid*, p. 123.

15 Marshall, *M.D.* p. 304. Heavy-based ware, types, P, R, and S.

Pottery Motifs and Designs Common to Harappa and Iranian Cultures

The repertoire of the Harappa vase-painters included both representational and geometric patterns. As on the painted wares of Iran, they are generally executed on the shoulders and necks of the jars, the lower portions being left plain. In this arrangement we see a tendency to group the decorative elements in horizontal panels rather than in the vertical registers so common on the Iranian ware.

Some of the designs of Harappa pottery resemble those found in Iran, but the majority are different from the Iranian. The following geometrical, animal and plant motifs occur on the pottery of both countries. To consider first the geometrical devices; it must be remembered that the simple geometrical motifs, such as we are going to examine, do not constitute any proof of relation between the painted pottery of Iran and the Indus valley. Only if there are special features in the painted pottery, as in 'Scarlet ware', do such decorative elements imply affinity between the pottery of different countries. Apart from simple and almost universal designs the following may stand out as significant. The pattern called the 'double-axe motif', in which two triangles are placed with their points together is found on the pottery of the Harappa culture.[16] This design is common at Susa A[17] and Musyan.[18] It also appears on pottery from Sialk III[19] and Anau.[20] This motif is placed alternately upright and horizontally. On the Harappa sherds the interiors of triangles are hatched, but on the pottery from Susa and Anau, they are painted solid, in either black or red paint.

Chequers are fairly common on Harappan pottery. Alternate squares are either filled with solid paint,[21] or cross-hatched.[22] Sometimes the squares are filled with a dot and circle or short oblique strokes.[23] The pattern is quite popular in Baluchistan. It was a favourite motif on the painted ware from Musyan,[24] but is rare on the pottery of Susa A. It occurs in Sialk III,[25] and at Tall-i-Bakun.[26]

Comb Motif (Fig. 1)

This motif, so called because it resembles a comb, is fairly common on

16 Marshall, *ibid.*, Pl. XCII: 10; 18.
17 *M.D.P.*, VIII, Pl. VII. Figs. 1 and 5.
18 *M.D.P.*, VIII, Pl. VII. Fig. 155.
19 R. Ghirshman, *Fouilles de Sialk*, Pl. LXXII S. 150.
20 R. Pumpelly, *Explorations in Turkestan*, p. 128, 67.
21 a. Harappa, *A.R.A.S.I.* 1927-28, Pl. XXXV. g. b. *M.A.S.I.*, 48, Pl. XXIX: 37.
22 Marshall, *op. cit.*, Pl. XCII: 11, 12, 13.
23 *Ibid.*, Pl. XCII, 11, 12.
24 *M.D.P.*, VIII, Fig. 167.
25 R. Ghirshman, *op. cit.*, Pl. LXXX: c: 14.
26 Langsdorff & McCown, *Tall-i-Bakun*, p. 37: 4. Unfortunately the level in which this potsherd was found is not mentioned.

Fig. 1. 'Comb' Motives.
1 and 2. Harappa. 3. Mehi. 4-6. Sialk. 7. Susa A.

Harappa[27] (Fig. 1, 2) and Kulli pottery (Fig. 1, 3).[28] In Iran, it is a common feature on the pottery of Susa A, (Fig. 1, 7)[29] Giyan IV[30] and Sialk II (Fig. 1, 4-6).[31] At Tall-i-Bakun in level IV, the spread-out feathers of a bird painted on a potsherd convey the same idea. These latter representations, in fact, show more resemblance to handled-combs than the former.[32] This design does not occur at Hissar or Musyan.

27 a. Marshall, *op. cit.*, Pl. XCI: 13, 16, 24. b. Majumdar, *loc. cit.*, Pl. XXVIII: 40.
28 Stein, *M.A.S.I.*, 43, Pl. XXX, Mehi, 11.4.5.: Pl. XXIII, Kulli. V, VII. 2.
29 *M.D.P.* Vol. XIII, Pls. XV. XVI and XVII.
30 C. Contenau & R. Ghirshman, *Fouilles de Tepe-Giyan*, Pl. 63.
31 R. Ghirshman, *op. cit.*, Pls. L, A.2; XLVIII, D. 12; XLV, S. 1522.
32 L. Langsdorff & D. E. McCown, *op. cit.*, Pl. 25: 1, 5.

The comb motif is generally believed to represent a stylized bird or a long-haired and horned mountain goat or sheep. That it represents a horned animal is suggested by the occurrence of animals resembling this motif, portrayed alongside the 'sun' symbol on the specimens found in Baluchistan and the Indus valley.[33] In Susa A, the comb design is one of the commonest decorative elements and terminates in two stylized animal heads. The Giyan specimens are much more sophisticated. Here we see a double-headed comb representing clearly a stylized animal, depicted in profile. The eyes are indicated by black dots in small white circles. The legs, shown fused together, taper down to a fine point. The flowing beards are represented by small sigma-like strokes one above the other. At Sialk II, we perhaps see a mountain goat depicted in three different ways indicating the development of this design. In the first instance (Fig. 1, 4) we see the hatched body, two curved horns and a thick border along the lower part of the body. In the second stage (Fig. 1, 5) the head is missing—the first step in stylization. In the third attempt, even the lower line has been abandoned (Fig. 1, 6)—stylization is complete.[34] We do not get all the stages in the Harappa culture.

Plant Designs

As a plant motif is easy to paint, and is convenient for filling the surface of a pot, it is fairly common. The plant designs on the Harappa pottery are more naturalistic than those on Susa ware.

The most characteristic plant motif of the Harappa culture is the pipal leaf which occurs on the seals[35] as well as on pottery.[36] Elsewhere it occurs on Mehi pottery,[37] and on early seals from Susa.[38] A tree with a spiky leaves occurs on Harappa,[39] Mehi,[40] and Susa A pottery.[41] The Harappa pottery plant designs with the exception of the pipal and broad leaves (Fig. 3, 3) do not occur westward of the Khirthar range, which seems to have formed a natural barrier between the Indus valley and Baluchistan.

Animal Designs

The animal designs on Harappa pottery are somewhat conventionalized and are arranged on the plan explained on page 54.

The ibex is rarely represented on Harappa pottery. One example comes

33 The 'sun' symbol occurs on all the examples quoted above from Baluchistan and the Indus valley.
34 R. Ghirshman, *ibid.*, Pls. L. A. 2; XLVII. D. 12; XLV. 1552.
35 Marshall, *op. cit.*, Pl. CXII: 387.
36 It occurs on Jhukar pottery of Harappa level (Majumdar, *M.A.S.I.*, 48, Pl. XIV: 3); at Chanhudaro in the Harappa level (Pl. XX); and at Ghazi Shah (Pl. XXVI).
37 Stein, *M.A.S.I.*, 43, Pl. XXX: Mehi 11.1.3.
38 *M.D.P.* Vol. XVI, Pls. VIII, XXI, XXII.
39 Harappa, *A.R.A.S.I.* 1927-28, Pl. XXXV. g.
40 Stein, *loc. cit.*, Pl. XXIX: Mehi 11, 2.5.
41 *M.D.P.* Vol. XIII, Pl. 1: 2.

from Mohenjodaro.[42] In this case the design is painted in black on a light red slip. The ware is light red in colour. The animal has an elongated body and neck, long curved horns thrown back and stumpy legs. The body is hatched. At the back and below the neck in front are series of short strokes perhaps representing vegetation. The ibex must have been known to the people of Mohenjodaro, as it is still flourishing in the Khirthar hills about 50 miles to the west. The hatching of the body, instead of painting it solid black, appears also in the pottery of Early Dynastic Susa D and Musyan.[43] In Susa A, the bodies are solid.[44]

The humped bull is not represented on pottery, though the animal is depicted on the seals.[45] But curiously enough, this animal appears on the pottery of Nal-Nundara[46] and Kulli-Mehi, where it is one of the most characteristic motifs.[47] The bull is depicted on the black asphalt vases of Susa D[48] and on 'Scarlet Ware'.[49] Elsewhere in Iran it does not occur.

Relationship between Harappa Pottery and that of South-West Iran

Similarities between the pottery of the Harappa culture and that of Susa are the exception rather than the rule. For in the general style of its fabric and the use of black on red, Harappa pottery belongs to a later period than the buff painted pottery of Susa. That there was, however, some very remote and general relationship with the Susa region may be suggested by certain decorative devices common to the Harappa culture and south-western Iranian pottery, though there is a complete divergence in pottery forms. For instance, the double-triangle design is common to both, as well as being found in Turkmenia on the pottery of Anau. Another design, common to south-east and north-west Iran and to both Baluchistan and the Harappa cultures, is the comb motif (discussed on p. 55) which occurs in Susa A and Giyan IV and yet appears on the later pottery of Baluchistan and Harappa. The triangular motif with a stepped edge that is common on Nal pottery,[50] though it does not occur on the painted ware of Harappa, is represented there by pieces of shell inlay;[51] it occurs also on Seistan pottery[52] and at Anau.[53]

42 Marshall, *op. cit.*, Pl. XCII: 20.
43 *M.D.P.* Vol. XIII, Pl. XXV; 6.
44 *ibid.*, Pls. I-IV.
45 Marshall, *M.D.*, Pl. CXI. 328-340.
46 H. Hargreaves, *M.A.S.I.*, 35, Pl. XVII: 59; Stein, *M.A.S.I.*, 43, Pl. XXVI: Nun. 20.
47 Stein, *loc. cit.*, Pls. XXII: Kul. 1. VIII. 1, XXVIII: Mehi, 1.7.2.
48 *M.D.P.* Vol. XIII, Pl. XXIV.
49 *M.D.P.* Vol. XXIX, p. 105.
50 Hargreaves, *M.A.S.I.*, 35, Pl. XVII. 7.
51 Marshall, *M.D.* Pl. CLV. 33.
52 Stein, *Innermost Asia*, Pl. CXIII. R. R. VIII. 011.
53 R. Pumpelly, *Turkestan, etc.* Pl. 35. 6.

Steatite Vases from Mesopotamia, Susa and Mohenjodaro (Fig. 2).

From the lower levels at Mohenjodaro came a fragment of a green steatite vase bearing exactly the same intricate and very unusual pattern as a double vase, and many single specimens, of steatite found at Susa in association with other objects of the period known as Susa D. That the vase of which the fragment from Mohenjodaro formed a part, was an importation from the west, is rendered almost certain by its being a greenish-grey steatite, of which it is the only piece that has been found in the Indus valley.

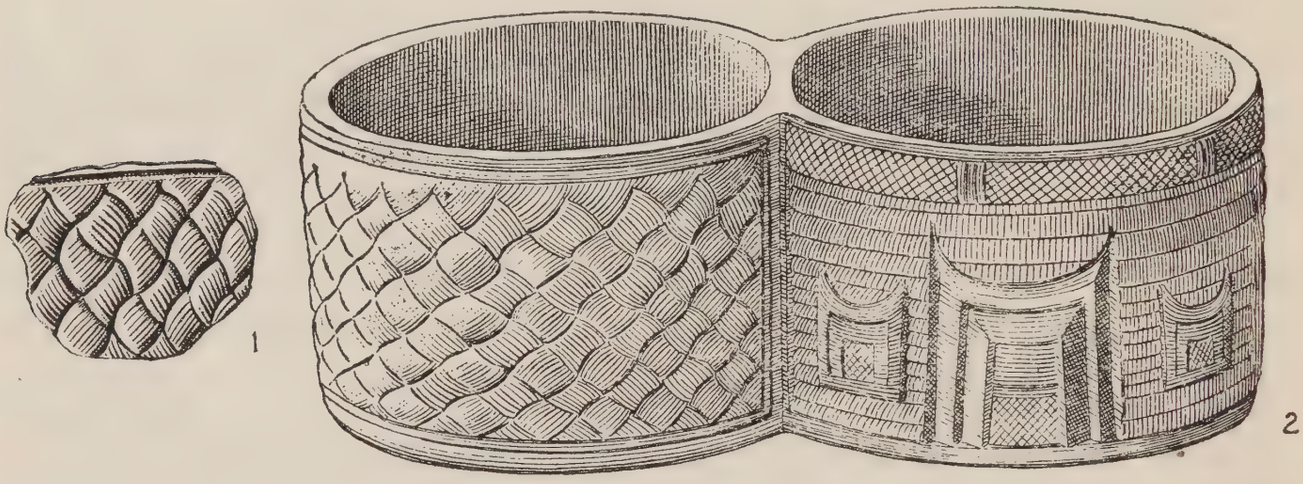

Fig. 2. Steatite vases from Mohenjodaro and Susa.

From Kish came three fragments from different parts of the excavations;[54] and a complete cylindrical vase from the Sin temple at Khafajah,[55] similar to those from Mohenjodaro, and Susa D. The Kish specimens came from a level which is dated to c.1800 B.C.[56] and the Khafajah vase was found in a building of the Akkadian period, and therefore can be dated to 2300-2200 B.C.[57] The Susa example belongs to the D period which corresponds to the Early Dynastic period in Mesopotamia. West of the Indus valley vessels of this type are much more common. From Mehi come a number of fragmentary incised stone vessels.[58] They include a tiny cylindrical vase; then there is a large cylindrical vase with four compartments. The well-executed incised decoration of these small and elegant vessels consists of hatched triangles and chevrons. These vases seem to have been used for holding valuable scents and cosmetics. Similar incised compartmented vases have been reported at Mohenjodaro and Shahi-Tump. The

54 H. Field, *Antiquity*, VII, p. 85, Pl. 2.
55 H. Frankfort, *O.I.C.* No. 19, p. 53, Fig. 56.
56 H. Field, *ibid.*, p. 85.
57 a. H. Frankfort, *O.I.C.* No. 16. p. 52. b. E. Mackay, *Antiquity*, Vol. VI, p. 356.
58 Stein, *M.A.S.I.*, 43, p. 160, Pls. XXVIII: Mehi 1.6.4. XX: Mehi 11.1.3. Mehi 111.11.3.

Shahi-Tump example is of dark grey clay or stone with incised vertical and horizontal lines and triangles.[59] The Mohenjodaro examples are in the form of small square boxes. The incised decoration on the Baluchi and Mohenjodaro stone ware is similar to that on vases from Bampur. Here, from the prehistoric sites of Bampur and Khurab, Stein discovered complete and broken vessels of a hard dark-grey stone, incised with a finely executed design which represents a hut with a central door and a window on either side. Incised triangles arranged in panels fill the rest of the background.[60] At Bampur and Katukan, Stein also discovered pottery vases incised in the same style.[61] Incised vessels with identical patterns as at Bampur sites also appear at Susa (Fig. 2, 2),[62] in Sumer[63] and at Mari in Syria.[64]

The Susa example is a double jar of steatite, one side of which is decorated with basketry design, and the other shows the hut design as on the Bampur vessels. From the Temple of Sin at Khafajah was discovered a complete cylindrical vase which shows all the details of a primitive Mesopotamian hut constructed of reed and matting exactly[65] as at Susa and Bampur. The two designs on it, the incised hut and the mat pattern, provide a connecting link between the Harappa culture, Iran and Mesopotamia. From Mohenjodaro come the two incised boxes, discussed above, and a fragment of a green steatite vase with mat pattern (Fig. 2, 1). Both these stone types are identical with those from Susa and Mesopotamia, as pointed out on page 58.

The Mari specimen is of great interest. Besides the incised patterns of Khurab ware, it also bears an incised rope cable pattern below the door and window of hut. The grey incised pottery from the Bampur valley[66] imitates the vessels from the Sumerian sites of Ur,[67] Tello,[68] Adab, shaped like a pyxis, Tell Asmar and Abu Habbah. The Tell Asmar vases which were found in Sin Temple IX may be dated stratigraphically to the period known as Early Dynastic II.[69] The incised designs represent prehistoric Sumerian architecture, the origin of which was a hut covered with wicker-work. The Adab example depicts the buildings on the bank of a river which winds through hills.[70] Their first appearance in Mesopotamia is therefore not likely to have occurred before Early Dynastic I: more probably not before Early Dynastic II.

59 Stein, *ibid.*, p. 91, Pl. XIII: Sh. T. 1119.
60 Stein, *Arch. Recon., etc.*, p. 109, Pl. VI. Khur. Fig. 1. 263, Pl. VIII. A. 34, A. 365, A. 14—A. 412.
61 Stein, *ibid.*, Pl. VI. Bam. A. 161 and Kat. 019.
62 *M.D.P.* Vol. XII, 69.
63 Herzfeld, *Iran in the Most Ancient East*, pp. 89, 90. Figs. 178, 179.
64 Parrot, *Syria*, 1935, pp. 126-127. Pl. XXVII: 3.
65 Andrae, *Das Gotteshaus und die Urformen des Bauens im alten Orient*, p. 76, Fig. 74 *a* and *b*.
66 Stein, *Arch. Recon., etc.*, Pl. VI.
67 Woolley, *Ur Excavations*, II, Pl. 178.
68 Parrot, *Tello*, Fig. 21.j.
69 Delougaz and Seton Lloyd, *Pre-Sargonid Temples in the Diyala Region*, p. 69, Fig. 63.
70 Herzfeld, *op. cit.*, p. 88, Figs. 177-179, and note that Fig. 179 is wrongly described from 'Ubaid'; it comes from Abu Habbah, See *Ur Excavations*, Vol. 1. (Al-Ubaid) p. 68, footnote 3 and Fig. 27 on p. 69.

It is generally believed that the incised stone ware with 'hut' design originated in the Bampur valley, where this pattern is also found on pottery. I think that most probably this ware originated somewhere in the west, maybe at Susa or in Mesopotamia. At Susa we find the 'hut' design on stone ware as well as on bitumen vases. Another point which would support this view is that in the Bampur region the 'mat' design on stone vessels is completely absent, whereas in the west both 'hut' and 'mat' designs occur together at Susa and Khafajah.

As vessels of the type represented by the steatite fragment from Mohenjodaro are much more common in Mesopotamia and Elam than in the Indus valley, we may conclude that they, like 'Scarlet Ware', originated in Mesopotamia in about 2800 B.C. (Early Dynastic I-II) and remained in fashion until about 2500 B.C. During this period they were, perhaps, imported into Susa, and possibly at a still later date, a Mohenjodaro merchant on his return trip from Mesopotamia may have carried one complete vessel which, when broken, was thrown away. On the other hand this vessel may have reached the Indus valley direct by the sea route between Sumer and Mohenjodaro, that I have discussed elsewhere.

Relationship Between Harappa Culture and North-East Iran

We have already shown in our discussion of the available evidence that no close relationships can be established between the cultures of Harappa and south-western Iran. Now we will consider some more material from the sites of north-eastern Iran and Anau in the Turkmen S.S.R. First we will examine

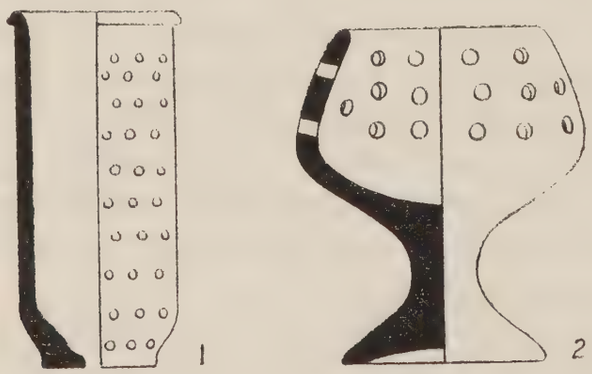

Fig. 3. Perforated vases—1. Harappa. 2. Hissar.

some distinct types of pottery which appear to be common in Harappa culture and the sites of north-east Iran. These types include dish-on-stand, spouted feeding cups; knobbed ware; perforated heaters; and others, but only the last named need be discussed in this abbreviated article.

Perforated vessels (Fig. 3, 1) are found in considerable numbers on all the

sites of Harappa culture. The majority of the vessels are tall and cylindrical in form. They were shaped on the wheel. Their paste is porous and burns to a red tone. In some cases the slip is cream. The holes are proportionate in size to the vessel. In some specimens the base, too, is pierced—perhaps to increase the air circulation inside the vessels when the charcoal was burnt.

Outside the Indus valley, this type occurs at Kulli[71] and other prehistoric sites in Baluchistan. At a site near Awaran,[72] Stein found a complete vessel with ashes and charcoal. This discovery confirmed the view of Marshall, who had regarded these vessels as heaters[73] rather than strainers.[74] But these perforated vessels could have been used as strainers.

Perforated vessels have been found in Hissar III, A, B, C (Fig. 3, 2), Tureng Tepe and Shah Tepe. The shapes are certainly different at these sites, but this fact is of little consequence in view of the general difference in the shapes of the pottery used by the Harappa culture peoples. At Hissar, perforated vases occur in all the sub-phases of III. Here, in constrast to the Harappa heaters, they are hand-made, with granulated yellowish brown and buff surface. The paste is a coarse, greyish brown.[75] The Hissar specimens are in the form of a footed chalice without perforation in the base. At Tureng Tepe was found a footed heater of coarse grey ware.[76]

At Shah Tepe a large number of perforated heaters have been found. These are of three types: a coarse ware, mixed with grit, red outside, reddish-grey and sooty inside, with close-set perforations; a well-burnt red ware with sparse and large holes; a black ware of even consistency. Most of the vessels are in the form of a bowl with flat bottom.[77]

Other Objects

Beads and metal objects similar to several of those from Harappa, Mohenjodaro and Chanhudaro have been found on the sites of north-east Iran also. Their striking similarity to each other suggests a close connection between the Harappa culture and that of the north-east Iran and Anau.

Etched carnelian beads are of three types: one with a white pattern on the natural red background of the material; the second with a white background and a black design on it; and the third type with a red background and black decoration. The first type is the commonest. It occurs fairly frequently on all

71 Stein, *M.A.S.I.*, 43, Pl. XXV.
72 *Ibid.*, p. 64, 130.
73 Marshall, *M.D.*, p. 313.
74 E. Mackay, *Antiquity*, V, p. 466.
75 Schmidt, *op. cit.*, p. 180 & 184, Pls. XXXVI, XLIII.
76 Wulsin, *Excavations at Tureng Tepe*, p. 9, Pl. XIII: 5.
77 Arne, *op. cit.*, p. 212, Pl. LV.

the principal sites of the Indus valley.[78] In Mesopotamia, it is found at Kish,[79] Tell Asmar[80] and Ur.[81] In north-eastern Iran, such beads occur at Hissar III,[82] and Shah Tepe IIa.[83] Etched carnelian beads also are found in Susa D.[84] The second type of etched carnelian bead is very rare. Its surface is whitened over by some process, and then a design in black is etched by means of a metal salt.[85] In the third type the natural red background is etched in black. This type is also rare.

The favourite patterns include an 'eye' design, 'figure-of-eight' and a very elaborate design consisting of nine compartments: one in the centre and eight around it. The central and the corner compartments each contain one white circle. The 'eye' design occurs on Hissar III etched carnelian beads also.[86] The figure-of-eight was a favourite design in the Indus valley and Mesopotamia. Beads with elaborate patterns seem to be rare, as only two such beads come from Ur,[87] two from Mohenjodaro,[88] two from Chanhudaro,[89] and one from Shah Tepe IIa.[90] These beads provide one of the most important links between the Harappa culture, Mesopotamia and Iran. Mackay is of the opinion that these carnelian beads were obtained from the Indus valley, for no unfinished specimens have been found in Mesopotamia, though unfinished beads are well known there.[91]

The Shah Tepe bead shows a remarkable similarity in detail to those from Mohenjodaro, and appears to have been made by the same lapidary who manufactured the Mohenjodaro specimens. This bead from Shah Tepe thus gives a definite clue for establishing cultural contact between the inhabitants of Harappa and the peoples of north-east Iran. And as the Mesopotamian specimens provide evidence for deciding the date of the Harappa culture, so the discovery of an etched carnelian bead at Shah Tepe, identical with those from Mohenjodaro, is a possible indication that the Shah Tepe culture may be contemporary with some phase of the Harappan. As only one specimen of this

78 Marshall, *M.D.* Pl. CXLVI. 43, 44.
Mackay, *F.M.D.* Pl. CXXXV, 3.
Mackay, Ch.D. Pl. LXXXIX. 1-15.
79 Mackay, *The 'A' Cemetery at Kish I*, p. 56.
80 Frankfort, 'The Indus Civilization and the Near East', *Annual Bibl. of Indian Archaeology*, 1932, Pl. I, 1.m.
81 Woolley, *Ur Excavations, II*, Pl. 133.
82 Schmidt, *loc cit.*, p. 223, Pl. XXXV.
83 Arne, *loc cit.*, p. 289, Pl. XCII.
84 The Susa D etched carnelian beads are identical with those from Harappa culture centres and the Mesopotamian sites. These beads are in the reserve collection in the Louvre.
85 H. C. Beck, *Antiquaries Journal*, XIII. p. 384.
86 E. F. Schmidt, *op. cit.*, Pl. XXXV.
87 C. L. Woolley, *Ur Excavations: The Royal Cemetery*, Pl. 133.
88 Marshall, *M.D.*, Pl. CXLVI: 43.
89 E. Mackay, *Ch.D.* p. 201, Pl. LXXIX. 12. 13.
90 T. J. Arne, *op. cit.*, Pl. XCII.
91 E. Mackay, 'Bead Making in Ancient Sind'. *Journal of the American Oriental Society*, 57, No. 1, p. 3.

type of bead has come to light from Shah Tepe, it seems probable that it was imported from the Indus valley *via* Makran, Seistan, Herat, Damghan and Asterabad.

Stein collected some etched carnelian beads from the Bampur valley.[92] But Beck, on account of their patterns and resemblance with some of the beads from Taxila, inclines to think that the Bampur heads are of a late period.[93]

Notched Beads.

Notched beads occur in limited numbers at Harappa and Mohenjodaro. The shape is very peculiar in that the edges of the longer sides are notched.[94] The figured beads are made of faience or some kind of paste which was glazed, and is rhomboidal in section. There are beads of this type from Ur and two specimens are reported from Kish.[95] The latter are made of shell and were found in the A graves, dateable to Early Dynasty III. The Harappa specimens are made of either alabaster or faience. The curious shape suggests that they had an amuletic rather than an aesthetic value.[96] Similar beads have been found at both Hissar III[97] and Shah Tepe, IIa.[98]

Copper Antimony Pots and Rods (Fig. 4).

At Hissar in the burials of III.c., Schmidt found besides other objects, some copper rods or pins with blunt ends, surmounted with animal figures and with other designs; and small narrow-mouthed vases of pottery and metal (Fig. 4). A cross-shaped rod representing a pair of birds or animals was found placed in a small pottery vase which was filled with black powder.[99] The black powder seems to be antimony. This is a very valuable piece of evidence as it attests the use of black powder with a thin tapering rod. Anyone who is familiar with the eastern custom of using cosmetics and black eye-paint will immediately recognize these tiny narrow-mouthed vases and the 'pins' found at so many ancient sites, as antimony pots and rods. Such pots with ornamented rods have been found in Luristan and described as 'sepulchral idols'.[100] I think this view is not correct, but the so-called 'sepulchral idols' and their 'stand' are the pots and rods for applying antimony to the eyes.

92 Stein, *An. Arch. Reconn.* p. 77.
93 H. C. Beck, *Ant. J.*, XIII, p. 393.
94 Marshall, *M.D.*, Pl. CXLVI. 37.
95 E. Mackay, *Excavations of Palace A and Cemetery A.* Anthropology Memoirs, Field Museum, Chicago, Vol. I, parts I & II, pp. 39-40, 186, Pl. 60.
96 E. Mackay, *Ancient Sind, Sumer & Elsewhere*, p. 463, Pl. on p. 459: 3.
97 E. F. Schmidt, *ibid.*, p. 231, Pl. LXIX.
98 T. J. Arne, *ibid.*, Pl. XCII. Grave B. 1157, pp. 83, 148-149.
99 E. F. Schmidt, *Pennsylvania University Museum Journal*, Vol. 23, pp. 414-442, Pls. CXXXI: H. 170; CLII: OF. 19.
100 a. A. Godard, 'Bronzes du Luristan', *Ars. Asiatica*, XVII; b. R. Heine-Geldern, *Journal of the Indian Society of Oriental Art*, Vol. IV, p. 11.

From Mohenjodaro and Chanhudaro come a number of small cast bronze vases with long necks and narrow mouths.[101] These miniature bronze and polychrome pottery vases (Fig. 4) were perhaps intended to hold some valuable cosmetic stuff, as they could hardly have been used for any other

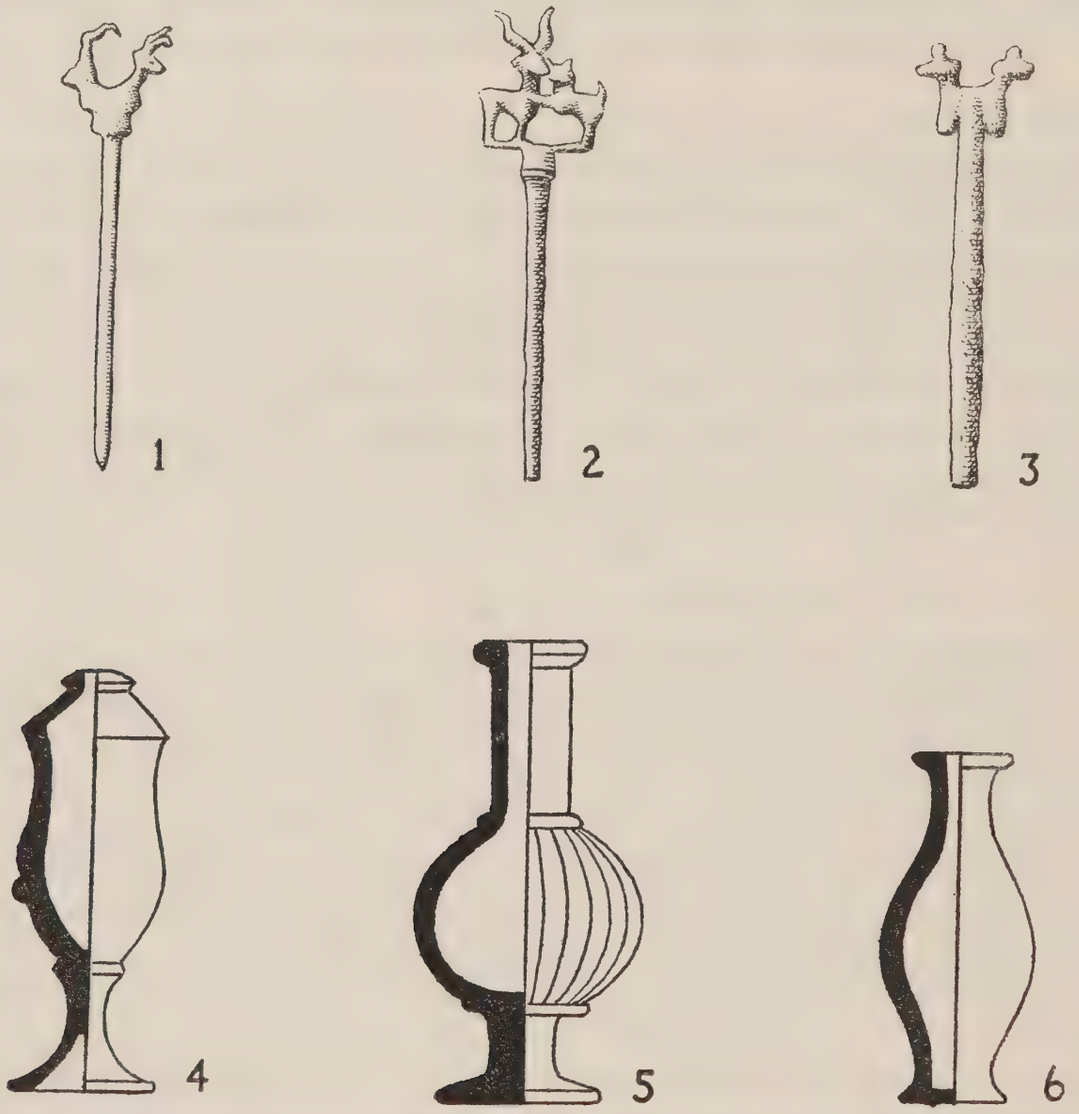

Fig. 4. Antimony rods and pots—1-2, 4-5. Harappa. 3 and 6. Hissar III.

purpose. The Chanhudaro specimen (Fig. 4, 5) is of special interest. It has a melon-shaped fluted body resting on a high pedestal, and long plain neck with bead rim. The lower part of the foot is not properly smoothed so that the vase wobbles slightly. This minor defect was rectified in other specimens. The vertical fluted ornamentation of its body is unique, and is perhaps the earliest example of its type. It does not occur elsewhere in that period.

101 a. John Marshall, *M.D.*, p. 492, Pl. CXL: 16. b. E. Mackay, *F.M.D.*, Pls. CXXVIII: 18: LIV. c. E. Mackay, *Chanhudaro*, Pl. LXXIII.

Piggott, inverting this elegant vase, has described it as a miniature mace-head and has compared it with mace-heads from Luristan, Hissar and Cemetery 'B' at Sialk.[102] I think it is more appropriate to describe this 'metal object' as a cosmetic or antimony pot rather than a mace-head for the following reasons: it is too small to be a mace-head; the perforation for holding the mace does not run right through it as in the case of Iranian specimens; the opening of the mouth is too narrow to hold even a minature handle of a mace, it measures only 0.22 inches. The total height is 3.6 inches, of which the neck is 1.4 inches. Our argument is strengthened very much when we compare with it the Mohenjodaro bronze miniature plain vase which is of the same form and size.[103] Two more specimens from Mohenjodaro, one in bronze (Fig. 4, 4) and the other in polychrome pottery, made on the same lines,[104] further support our viewpoint.

Animal-Headed Pins (Fig. 4).

The other ornamental type of pin found in the Harappa layers of Harappa and Mohenjodaro is the one which has its head surmounted by one or two animals or birds. Pins of this type are rare; only three specimens have been found. From Harappa comes (Fig. 4, 2) a pin with a horned goat attacked by a dog.[105] Two pins, one in bronze[106] and another in ivory,[107] were found at Mohenjodaro. The former depicts a pair of 'black bucks' (Fig. 4, 1) in seated position, and the ivory pin-head, the lower part of which is missing, represents a dog.

Like most of the metallic objects found on Harappa sites, the animal-headed pins were cast and their distribution is very wide. The earliest specimens come from Susa A, which, if correctly assigned to the Uruk period, need not be later than 3300 B.C.[108] At Kish Mackay found in Cemetery 'A', probably of Early Dynastic III date, a bronze pin with two horns.[109] At Chagar Bazar Professor Mallowan discovered two pins: one surmounted with a pair of doves, and the other (from a grave) with a long-horned goat.[110] These pins may be of approximately the same date as the Kish specimens, *c.* 2900-2700 B.C. From the fourth Shaft Grave at Mycenae, dated about 1600 B.C., comes a ram's-head gold pin.[111] At Alishar in the period

102 S. Piggott, *Ancient India*, No. 4, p. 38, Fig. 5: 1.
103 Marshall, *M.D.*, p. 492, Pl. CXL: 16.
104 Mackay, *F.M.D.*, Pls. CXXVIII: 18; LIV: 1.
105 Vats, *Excavations at Harappa*, Pl. CXXV. 36.
106 Mackay, *F.M.D.* Pl. C. 3.
107 Marshall, *M.D.* Pl. CLVIII. 1.
108 *M.D.P.* Vol. XXV. p. 197, Fig. 34.
109 E. Mackay, *The 'A' Cemetery at Kish*, p. 46. Pl. XIX. 12-14.
110 M. E. L. Mallowan, *Iraq*, Vol. III. p. 27, Fig. 8. 2. and Pl. XLIII. 18.
111 Evans, *The Shaft Graves*, etc. p. 43, Fig. 34, *b*.

of the Hittite Empire bronze and copper pins show a great variety of forms. One pin-head is in the shape of a bird.[112] The double-headed animal pin found in Koban cemeteries is in the style of Harappa pins,[113] but unfortunately it is non-stratified, and therefore we do not know whether it belongs to the earlier or later Koban periods which Schaeffer has dated 1550-1400 and 1400-1200 B.C.[114]

Similar ornamented pins have been found in Luristan graves.[115] The majority of these pins have been dated by Przeworski between 1250-600 B.C.[116] Animal-headed pins do not occur at Sialk and Giyan; but in Hissar III we find such pins among the mortuary equipment. There, from the 'first warrior's' grave, besides other grave goods, comes a copper pin with bird heads.[117] The pin found in the 'second warrior's' grave ends in two horned animal heads (Fig. 4, 3). A similar copper pin with a ram as head was found in the grave of the 'little child'. This type does not occur at Shah Tepe, Tureng Tepe or Anau.

Other Miscellaneous Objects Affording Proof of Connection Between the Harappa and North-East Iranian Cultures

Other objects of common resemblance between the Harappa and north-east Iranian culture include the following: gold fillets with perforation at ends, bronze coiled bracelets and finger rings; terracotta human and animal figurines; double-headed animal protomes; zoomorphic vases; bird whistles; marbles and toy cart-wheels.

Bronze Coiled Bracelets and Finger Rings.

On the Harappa culture sites, bracelets and finger rings were made in metal, faience, shell or pottery. The majority of these are made of a single wire, but some coiled specimens have also been found. The coils vary in number.[118] Bracelets and rings of this type first occur in Hissar II,[119] but are more common in III. Some of the Hissar bracelets have twelve coils.[120] All these bracelets are made of medium thick copper wire, forming rings

112 Von der Osten, *The Alishar Hüyük Seasons of 1930-32*, Part II. p. 253, Fig. 283: *e*. 945.
113 F. Hančar, *E.S.A.*, p. 146. Fig. 17, *d*.
114 C. F. A. Schaeffer, *Stratigraphie Comparée, etc.* p. 533.
115 F. Hančar *E.S.A.*, IX p. 101. Fig. 42.
116 S. Przeworski, *Archaeologia*, 88. p. 237.
117 E. F. Schmidt, *Penns. Univ. Museums Journal*, Vol. XXIII. p. 422, Pl. CLII. pp. 442-446, Pl. CXXXI.
118 Unfortunately the coiled metal bracelets from Harappa or Mohenjodaro have not been illustrated, but a pottery specimen from Chanhudaro very well attests the use of coiled bronze bracelets. (Mackay, *Chanhudaro*, Pls. XC. 34: XXIII.)
119 E. F. Schmidt, *ibid.*, p. 120, Pl. XXVIII.
120 *ibid.*, p. 206-207, Pls. LIII, LIV.

which are coiled. Coiled bracelets and rings also occur at Shah Tepe, but the coils are not as many as at Hissar III.[121]

Double Animal Protomes

Double-headed animals are by no means unusual in the Early Dynastic and Agade periods of Mesopotamia. From the Royal Cemetery of Ur come a pair of golden antelopes and bulls of remarkable workmanship.[122] In Hissar III level, Schmidt discovered a number of small double animal-protomes in copper.[123] They resemble those from Luristan.[124] No double animal-protomes in metal or pottery have been found in excavations on Harappa sites. But now we know that similar double animal-protomes were made at Harappa, as one terracotta specimen of well-burnt pinkish clay and representing a bull has been found at Harappa on the surface by Colonel Gordon.[125] This piece is of great interest as it provides another linking point between the Harappa and north-east Iranian culture. The function of such double animal-protomes is indeterminable.

Bird Whistles

Bird whistles in the form of hens are fairly common at Harappa and Mohenjodaro. They are hollow and have a small hole near the tail, which when blown produces a loud shrill note. The pedestal-like bases permit of their easy standing.[126] Exactly similar bird whistles have been found at Shah Tepe.[127] Arne has described them as theriomorphic clay vessels. I think they are toys. Even today Indian and Pakistani children have such terracotta toys. They are not found elsewhere in Iran.

Zoomorphic Vessels

With one exception such pots are unknown on Harappa sites, though they are well represented in Sumer,[128] Susa D[129] and Hissar III.[130] The Harappa specimen which comes from Mohenjodaro is of pottery and is covered with a creamy slip. It is in the shape of a couchant ram.[131] The modelling is excellent, the body is hollow and there is a hole in the middle of the back. The Susa D

121 T. J. Arne, *ibid.*, p. 297, Pl. XCII.
122 C. L. Woolley, *Ur Excavations*, Vol. II, Pl. 142.
123 E. F. Schmidt, *ibid.*, p. 188., Pl XLVI: H. 5141.
124 R. Heine-Geldern, *ibid.*, p. 12, Pl. XVII: 6.
125 His collection is in the Institute of Archaeology, London, and the specimen in question bears the catalogue No. 51/1929.
126 Marshall, *M.D.*, p. 551, Pl. CLIII, 17, 18.
127 T. J. Arne, *op. cit.*, p. 257, Fig. 537a.
128 H. Frankfort, *O.I.C.* No. 17, p. 33, Fig. 27. This is a bird-shaped pot.
139 *M.D.P.* Vol. XIII, Pls. XXXVII, XXXVIII.
130 E. F. Schmidt, p. 188, Pl. XLVI: H. 2785.
131 E. Mackay, *ibid.*, Pl. LXVI. 23.

specimens are in the form of seated animals and birds. One of the Hissar III vessels represents a ram in grey ware decorated with burnished straight and zig-zag lines. It has curved horns, and the eyes are indicated by small rings; there is a tubular hole in the middle of the back.[132] A painted clay sheep, in a form resembling the Shah Tepe specimen, but with an opening in the middle of the back like the Hissar vessel, was discovered by Ghirshman in Sialk III.7.[133]

Marbles

And finally we come to marbles which are known from many ancient sites. They have been found in large numbers at Anau III in pottery and stone.[134] They are plain as well as incised.

132 E. F. Schmidt, *Excavations at Tepe Hissar*, p. 189, Fig. 113.
133 R. Ghirshman, *Sialk* I, Pl. 1. XIX. 2.
134 R. Pumpelly, *Turkestan*, p. 182.

ABBREVIATIONS

Ch.D.	*Chanhu Daro Excavations*, 1935-6. New Haven 1943.
M.A.S.I.	*Memoirs of the Archaeological Survey of India.*
M.D.P.	*Délégation en Perse, Mémoires de la.*
M.D.	*Mohenjo-Daro. and the Indus Civilisation.* London. 1932.
F.M.D.	*Further Excavations at Mohenjo Daro.* New Delhi, 1938.
A.R.A.S.I.	*Annual Report of the Archaeological Survey of India.*
Stein. *Arch. Recon.*	*Archaeological Reconnaissance in North-Western India and South-Eastern Iran.* London, Macmillan, 1937.